INVENTORY OF INDUSTRIAL SITES PRODUCING OR USING COAL TAR AND RELATED TARS IN ONTARIO

VOLUME I

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Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario

Volume I

Prepared for

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EXECUTIVE SUMMARY

This report in two volumes describes the results of an inventory and preliminary assessment of potential environmental impacts of industrial sites producing and using coal tar and related tars in the Province of Ontario.

This study is intended to continue the inventory and assessment process started by the "Inventory of Coal Gasification Plant Waste Sites in Ontario" conducted in 1987 for the Ontario Ministry of the Environment. The coal gasification plant inventory study was prompted by the discovery in 1986 of buried coal tar wastes at two sites in Ontario and identified 41 former sites. Tars and sludges produced by coal gasification plants and produced or used by the industries identified in the current study contain polynuclear aromatic hydrocarbons (PAH) and light aromatic hydrocarbons. Several compounds in these chemical groups have been documented as cancer causing. Adverse human health effects from exposure to these chemicals is primarily by inhalation and dermal contact.

Following the earlier study, a four phase approach was used to complete this study. The phases were: 1) a historical record search to identify types of industries and sites producing or using coal tar and related tars; 2) site reconnaissance visits to each former site to determine land use and evidence of buried waste; 3) assessment of potential environmental impact at former sites and 4) where appropriate development of recommendations for further action.

The historical record search identified six types of industrial operations that were likely to have produced or handled significant volumes of tar. These operations were: coal tar

EXECUTIVE SUMMARY (cont'd)

distillation plants, creosoting plants, roofing felt and tarred paper products manufacturers, by-product charcoal and coke oven plants of the iron and steel industry, industrial manufactured gas plants and wood distillation plants. Forty-four industrial sites in 25 different communities were identified from these six types of industries. Thirty-five of the sites were former operations and nine of the sites are currently active. The list of these former and active sites together with their street address and approximate years of operation are given in the Table accompanying this summary. The distribution of these former and active sites in Ontario is shown on Map 1 in this report.

Site reconnaissance visits were made to all but one of the former sites identified from the search of historical records. The primary purpose of the site reconnaissance visits was to identify any visual and olfactory evidence of buried wastes and any environmental impacts that may be related to the wastes. Because many of the former sites are located in developed areas, the site reconnaissance visits included inspection of sewers, basements and building sumps. Information collected from site inspection, from the record search and from municipalities were recorded on a fact sheet for each site.

Using data recorded on the fact sheets and a set of criteria developed previously for the "town gas" plant study (INTERA, 1987), a qualitative assessment of potential environmental impacts was performed for each former site. The assessment criteria are based on characteristics of the site, evidence of buried wastes and characteristics of potentially impacted resources. Options for further actions at each former site are developed based on the assessment of potential environmental impact. Active sites were not subject to

detailed on-site inspections or assessment of potential environmental impact as per the terms of reference of this study. In some cases, there are environmental issues at active sites identifed in this study but at all of these sites investigations are underway and the sites are being looked at by the Ontario Ministry of the Environment.

As a minimum, options for further action at every former site include notification of municipalities and current property owners that tars containing PAH may be buried on-site.

At twenty-three of the thirty-five former sites, potential environmental impacts are considered minimal based primarily on a lack of evidence of buried waste.

At six of the identified sites there is evidence of tar wastes in the subsurface but potential environmental and human health impacts are minimal because of a lack of receptors for impact from the waste. These sites include Barrett Co. - Toronto, Domtar - Toronto, Paterson/Barrett - Toronto, Paterson - Toronto, Cyanamid - Niagara Falls and Donald Wood Products - Donald. Future excavation or development at these sites should be conducted with caution.

At six of the sites with evidence of tar wastes there is potential for environmental impact and site specific recommendations are developed for these sites to either more clearly define the chemical nature and physical extent of the wastes or to minimize potential impacts. These sites include Currie Products - Ottawa, Canada Creosoting - Sudbury, Canada Creosoting - Thunder Bay, Calder Creosoting Co. - Sioux Lookout, Domtar - Cornwall, and Standard Chemical - South River.

List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario

Community	Company	Address	Approximate Years of Operation
Coal Tar Distillation Plants			
Hamilton	Currie Products	350 Wentworth St. N.	1978-present
Hamilton	Dominion Tar and Ammonia, Hamilton Tar & Ammonia, Hamilton Tar Products, Currie Products	East side Caroline between Mulberry & Sheaffe Sts.	1901-1977
Hamilton	Dominion Tar & Chemical, Domtar Chemicals	West side Strathearne Ave. north of Burlington St.	1950s-present
Ottawa	Hamilton Tar Products, Currie Products	170 Lees Ave.	1922-1948
Sault Ste. Marie	Dominion Tar & Chemical, Domtar Chemicals	South of Baseline (Wilde Ave.) and Dryden	1911-present
Thunder Bay (Port Arthur)	Northern Tar & Chemical, Northern Wood Preservers	2nd Ave. & Water Front S. (Maureen St.)	1938-present
Toronto	Barrett Co.	675 Lakeshore Blvd. E.	1922-1960s
Toronto	Dominion Tar & Chemical/ Domtar Chemicals	801 Lakeshore Blvd. E.	1925-1974
Toronto	J.D. Paterson Co./ Barrett Co.	5-33 Hahn Place	1900-1922
Toronto	Imperial Varnish & Colour	North side Lakeshore Blvd. E. between Logan and Morse Sts.	1900-1960
Windsor	Ford Motor Co.	Between Riverside Dr. E. and Wyandotte, west of Belle Isle (Belleview)	1923-1950s

List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
Creosoting Plants			
Sioux Lookout	Canada Creosoting Co. Calder Creosoting Co.	1.6 km east of First Ave.	1928-1960
Sudbury	Canada Creosoting Co. Domtar Chemicals	South side Lorne St. Between Sutherland & Bulmer Sts.	1925-1964
Thunder Bay (Fort William)	Canada Creosoting Co. Dominion Tar & Chemical	North of Carpenter St. East of 105th St. on McKellar Is.	1940-1946
Trenton	Canada Creosoting Co., Domtar Chemicals	126 Marmora St.	1913-present
Roofing Felt and Tarred Paper Products Manufacturers			
Brantford	Brantford Roofing Co.	22 Sydenham St.	1906-1950s
Cornwall	Domtar Construction Materials Ltd.	Northwest corner Seventh & Cumberland Sts.	1940-1968
Hamilton	Building Products Ltd./ Bird and Son Division	70 Beach Rd. at Gage	1910-1954
London	Canadian Roofings Ltd./ London Roofings/Viceroy Manuf./Bishop Asphalt Papers	1350 Trafalgar Rd.	1939-1957
Toronto	Paterson Manufacturing Co.	297-307 Front St. E.	1882-1899
Toronto	Toronto Asphalt Roofing Manuf. Co.	15 Oxford Dr.	1922-1950
Windsor	ACME Roofing Co.	Southeast corner Walker and Edna Sts.	1917-1923
Windsor	Canadian Roofing Manuf. Ltd.	Southeast corner McDougall and Shepherd Sts.	1914-1921

List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
By-Product Charcoal and Coke Oven Plants of the Iron and Steel Industry			
Hamilton	Dominion Foundries & Steel, Dofasco	North of Burlington E. between Kenilworth N. & Ottawa N.	1951-present
Hamilton	Steel Co. of Canada	Wilcox St.	1918-present
Nanticoke	Steel Co. of Canada	Regional Rd. 3 and Lake Erie	1981-present
Sault Ste. Marie	Algoma Steel Ltd.	South of Baseline & Goetz Rd.	1899-present
Industrial Manufactured Gas Plants			
Cambridge (Preston)	Pattinson Woollen Mill	498 Eagle St. N.	1870s-1890s
Ottawa	Dominion of Canada Fuel Testing Laboratories	552/562 Booth St.	1911-1940s
Niagara Falls	American Cyanamid Co. (Fertilizer Works)	Stone Rd. and Fourth Ave.	1916-1920
North Bay	Pintsch Compressing Co.	535 Stanley St.	1910-1956
Toronto	Pintsch Compressing Co.	Foot of Peter St. east of Spadina	1906-1960
Windsor	Union Natural Gas Co. of Canada	Northeast corner Howard Ave. and E.C. Row North Service Rd.	1929-1950s
Wood Distillation Plants			
Deseronto	E.W. Rathbun, Standard Chemical Co.	Main & First St.	1890-1920s
Donald	Donald Wood Products, Standard Chemical Co.	Part Lot 6 and 7, Concession 1, Township of Dysart, Haliburton County	1908-1945

List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
Wood Distillation Plants			
Fenelon Falls	Standard Chemical Co.	Francis St. and Cameron Lake	1903-1916
Lindsay	Canadian Industrial Alcohol Co. Ltd.	North side Eglington Rd. near Scugog River	1930-1950
Lindsay	Hodgson Bros. Chemical Co. Ltd.	St. Paul and Deniston Sts. near Scugog River	1919-1930s
Longford Mills	Standard Chemical, Iron and Lumber Co., Standard Chemical Co.	Lot 20, Broken Frontage Rama Township	1900-1943
Parry Sound	Standard Chemical Co.	300 m north of Isabella between railway tracks & Georgian Bay	1909-1925
Sault Ste. Marie	Algoma Steel Corp. Standard Chemical Iron & Lumber Co., Standard Chemical Co.	Near St. Mary's River, South of 3rd St.	1911-1928
South River	Standard Chemical, Iron and Lumber Co., Standard Chemical Co.	1 km east of Village on South River	1907-1967
Thornbury	Thornbury Reduction, Standard Chemical Co.	Northeast corner Mill and Bay Sts., at Georgian Bay	1916-1925
Trout Creek	Dominion Wood and Lumber Co.	Concession 1, Parcel 3498, near Hwy 11 east of railway	1920s

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1. INTRODUCTION

1.1 BACKGROUND

In 1986, buried coal tar wastes were discovered at two abandoned coal gasification plant sites in two urban areas in Ontario. Because these wastes posed a potential impact on human health and safety the Ministry of the Environment commissioned a study in 1986 to identify and assess the potential environmental and human health and safety impact of former manufactured gas plant waste sites in the Province of Ontario. A report entitled "Inventory of Coal Gasification Plant Waste Sites in Ontario" Volumes I and II, dated April, 1987 was produced from this study and addressed plant sites which produced coal tar wastes as a result of manufacturing coal gas for municipal consumption. The report (INTERA, 1987) identified 41 former coal gasification plant waste sites in 36 different communities in Ontario and has formed the basis for further investigations and remedial actions at many of these sites. The report also identified several other former industrial sites that produced or handled coal tar or oil tar and may also pose similar environmental concerns as coal gasification plant waste sites. These industrial sites are the subject of this study.

The inventory of industrial sites producing and using coal tar and related tars in Ontario is intended to continue the inventory process. The information collected during this study is expected to be of use to municipalities, land owners and developers and, as in the earlier study, may form the basis for further investigations and possible remedial actions at individual sites.

1.2 OBJECTIVES

The objectives of this study were threefold:

i) establish an inventory of industrial sites (both active and former) that produced and used coal tar and related tars in the Province of Ontario;

ii) determine the potential impact on human health and safety and the environment of each identified former industrial site;

iii) where appropriate, develop recommendations that would lead to actions which would more clearly define the chemical nature and physical extent of wastes at specific sites.

A four phase approach was adopted to meet the study objectives:

Phase 1 - Review of historical records;
Phase 2 - Site reconnaissance visits;
Phase 3 - Determination of likely potential environmental impact;
Phase 4 - Development of recommendations for further actions.

More detailed descriptions of the study approach and each work phase are provided in Section 2 of this report.

1.3 SCOPE

This report describes the results of a study which provides an inventory and assessment of industrial sites producing and using coal tar and related tars in Ontario. The inventory part of this study identifies both former and currently active industrial sites that produced and used coal tar and related tars. Active sites were identified to make the inventory complete and also because several of the active sites were operational pre-1950 when industrial operations were less concerned with environmental impacts than they are today. Assessment of likely potential environmental impact was completed for

each former site, but not for currently active sites as per the terms of reference for this study. In some cases, there are environmental issues at active sites identified in this study, but at all of these sites, investigations are underway and the sites are being looked at by the Ontario Ministry of the Environment.

The initial focus of this study was industrial sites that produced and used coal tar. This focus was based on the results of the previous "town gas" inventory study that identified coal tar as the most important waste product at municipal coal gasification plants. In the early 1900s coal tar became a valuable commodity and supported a variety of secondary industrial activities including tar distillation, creosoting and wood preservation, varnish and coating manufacturing, roofing felt manufacturing, abrasives and electrode manufacturing, and a multitude of refined coal tar products (e.g., dyes, explosives, disinfectants, perfumes, etc). In fact, the modern organic chemical industry originated from the availability of refined coal tar products.

Because of the diversity of secondary industries engaged in the use of coal tar it was necessary in the course of this study to conduct an initial identification of such industries and subsequent screening of these industries to focus on those sites likely to have buried coal tar wastes.

The details of this identification and screening are discussed in Section 2 of this report. Based on this work, the following industrial sites are the focus of this study:

- coal tar distillation plants;
- creosoting plants;
- roofing felt and tarred paper product manufacturers;
- by-product charcoal and coke oven plants of the iron and steel industry;

- industrial manufactured gas plants including Pintsch, coal and oil gasification operations;
- wood distillation plants.

Coal tar distillation plants, creosoting plants, roofing felt and tarred paper product manufacturers utilizied coal tar as a raw material. Industrial manufactured gas plants, by-product charcoal and coke oven plants and wood distillation plants created coal tar, oil tar or wood tar as by-products or waste products in their operations. Oil tar from manufactured gas plants and wood tar from charcoal by-product/wood distillation plants are similar in chemical composition to coal tars because of similar combustion processes used in each industrial operation. Both tars contain volatile organics (benzene, toluene, etc.) and polynuclear aromatic hydrocarbons (PAH). The descriptions of the industrial processes and practices relating to the generation and handling of tar for each of the above industrial activities are provided in Section 3 of this report.

In this report, identification of previous industrial sites was generally restricted to those plants operational in the period post-1919. This starting date generally coincides with the development of secondary tar processing industries, (i.e., tar distillation plants, creosoting plants, roofing felt and tarred paper manufacturers) the start of by-product coke oven operations, Pintsch gas plants and wood distillation plants. The list of sites included in this report however has also been supplemented by sites from the pre-1919 time period, encountered in the course of research.

The inventory of industrial sites producing and using coal tar and related tars provided in this report is considered to be as complete as historical records will allow in the period post-1919 and generally to have identified all the important potential industrial coal tar plant sites in the Province of Ontario for both the

pre- and post-1919 periods. It is likely that some small industrial coal tar plant sites operational in the period pre-1919 (i.e., roofing felt and coatings manufacturing, iron pipe dipping) have not been identified in this report. However based on the environmental significance associated with similar identified sites in both the pre- and post-1919 period in this report, these unidentified sites are not thought to be significant.

2. STUDY METHODOLOGY

2.1 PHASE 1 - REVIEW OF HISTORICAL RECORDS

The review of historical records was undertaken to:

- identify types of industrial operations producing and using coal tar and related tars in Ontario;
- review industrial processes and practices as they relate to tar production, handling and disposal;
- provide an inventory and description of former and active industrial sites.

The following sections outline the sources and methodology used to complete the above tasks.

2.1.1 Identification of Types of Industrial Operations

Initial research was conducted to identify the types of industrial operations producing and using coal tar and related tars in Ontario. This research was performed by reviewing a limited number of government reports and early industrial manuals and texts. Some of the more important source materials included:

- Canada Dominion Bureau of Statistics, Canada's Chemical Industries, Series 46-D-50, Ottawa (1947) by H. McLeod;
- Canada, Department of the Interior, Distillation of Hardwoods in Canada, Ottawa (1922);
- Canada, Department of Mines, Products and By-Products of Coal, Report 323, Ottawa (1915);

- The Industrial Applications of Coal Tar Products, London (1925) by H.M. Bunbury and A. Davidson;

- Coal Tar and Ammonia, Parts I and II, New York (1916) by G. Lunge;

- Manual of Industrial Chemistry, Volume II, New York (1926) by A. Rogers;

- "Coal Tar - Its History and Production", The Canadian Chemical Journal, Volume 2, March (1918) by C.W. Reynolds.

These texts, reports and papers identified a variety of industries engaged in the production and use of coal tar and related oil and wood tar in Ontario. An example of the variety of products and hence industrial operations based on coal tar is given in Figure 2.1. From these texts and other sources six types of industrial operations were identified as having the greatest likelihood to have left coal tar and related wastes in the ground.

These six types of industrial operations, listed in Section 1.3, were selected based on approximate size of operation, volume of tar generated or handled and a preliminary understanding of the tar handling and disposal practices.

2.1.2 Review of Industrial Processes and Practices

The six types of industrial operations were reviewed to investigate their technological processes and practices over the time period in which they operated in Ontario. The objectives of this work were to determine how tars were brought to or produced on sites within the industry, how they were handled there and if possible how they were disposed.

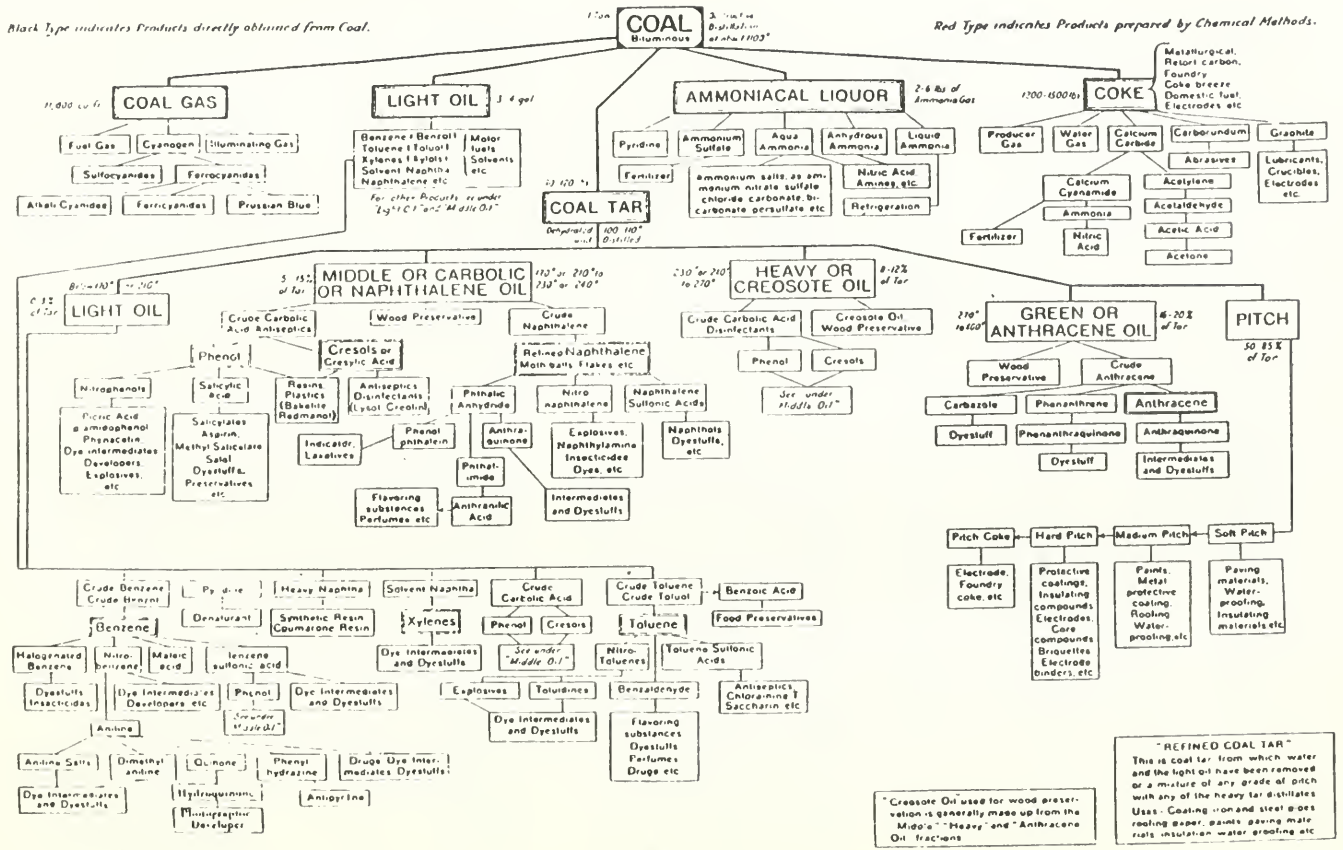


Figure 2.1 Coal tar products obtained from coal and refined coal tar (after Rogers, 1926)

Technical works on each of the industries concerned were extensively reviewed. These works included Government of Canada reports and contemporary industrial and scientific texts and journals. These works were located in the National Library, Ottawa, the National Research Council, Ottawa, Canada Institute for Scientific and Technical Information, Ottawa and the Canadian Mineral and Energy Technology Library, Energy Mines and Resources Canada, Ottawa. The individual source materials for each industry are identified in Section 4 and listed in the bibliography at the end of this report.

2.1.3 Inventory Listing of Sites

A search of historical records post-1919 was undertaken for each of the six types of industries to provide a list of sites, and any historical information on specific site operations, plant layout, and period of operation. The historical source materials for this work can be grouped by use according to site location and site characterization tasks.

Site location sources for each industrial operation included a selection of central directory or summary works that identified the existence, duration of operation and exact location of the sites. In general these source materials included:

- Dominion Bureau of Statistics Reports on specific industries, for example:

 - Series 36-D-50, Paper Using Industries;
 - Series 46-D-25, Chemicals and Allied Products Industry;
 - Series 46-D-47, Hardwood Distillation Industry;
 - Series 46-501, Directory of Chemical Industries in Canada;
 - Series 45-203, Coke and Gas Industry;
 - Series 46-204, Coal Tar Distillation Industry;

- Ontario Bureau of Mines Annual Reports on industries using mineral products;

- Canada Trade Indexes published by the Canadian Manufacturers Association;

- Provincial, Regional and City Directories and Gazeteers;

- Miscellaneous government reports and industrial journal articles, describing industrial operations.

Once a site was identifed in a community, historical records were further reviewed to confirm site existence and to characterize the site by providing information on the plant layout and details of plant operation. Relevant historical sources for this work include:

- Fire insurance plans and maps from:

 - The National Map Collection, Public Archives of Canada, Ottawa
 - Map Collection, Archives of Ontario, Toronto
 - Map Collection, Metropolitan Toronto Reference Library
 - Regional Map Collection, University of Western Ontario, London
 - local museum and archive collections;

- Historical air photos from the National Air Photo Library, Ottawa;

- Historical newspaper articles and photographs describing industrial site openings or closures, available from local archives and museums;

- Contemporary miscellaneous texts, articles and journal publications containing information on specific sites.

Fire insurance plans from the four major collections and local collections were the main historical sources used to characterize sites. Preparation of fire insurance plans for Ontario communities commenced in the late 1870s and stopped in the late 1950s. Such plans however are not available for all communities in Ontario and in particular for several of the wood distillation plants which were located in remote areas. In many of these cases historical air photos from the National Air Photo Library, Ottawa provided less detailed but reliable characterization of the site. Historical air photos are available for many communities in Ontario from the late 1920s and 1930s.

2.2 PHASE 2 - SITE RECONNAISSANCE VISITS

Reconnaissance visits were made to all plant sites, except the Sioux Lookout site, identified from Phase 1 activities. The Sioux Lookout site was inspected during this study by local Ministry of the Environment officials. Site visits were made in March and April, 1988. The principal purpose of site reconnaissance and on-site inspection for former industrial sites was to identify any evidence of wastes by visual and olfactory inspection and any environmental impacts that may be related to the wastes. On-site inspections of active industrial sites were not performed in this study. The site reconnaissance visits of both former and active sites also served to identify on- and off-site land use, site conditions and site access for possible future investigations and to obtain photographs of and additional local information on the site. Site reconnaissance work undertaken as part of this phase did not involve subsurface investigations, such as drilling or soil sampling.

The approach to site reconnaissance for former industrial sites was to utilize a consistent and thorough inspection of the site in conjunction with available air photos, plant plans, and plans of underground utilities including storm sewers.

The data collected from site reconnaissance visits of former industrial sites included:

- Visual evidence of tarry and other wastes at surface and in the near surface;
- Olfactory evidence of wastes both on- and off-site;
- Visual evidence of water pollution in surface waters and groundwaters;
- Confirmation of current land use both on- and off-site;
- Resource characteristics including proximity to and usage of surface water and groundwater resources.

Data on current land use both on-site and off-site and resource characteristics were also collected during site visits to active industrial sites.

Because of the visual character of tarry wastes (see Section 4), these wastes were in principle relatively easy to identify at surface and in the near surface. These wastes also pose the most significant potential health and environmental impact. Other wastes such as cinders, ash, coal fines and charcoal are also readily identified but these materials pose little health or environmental hazard and were only used to confirm the location of the plant.

Odours are noticeable and characteristic at tar waste sites as a result of the presence of lower molecular weight volatile organics (i.e., naphthalene, benzene, toluene, xylenes) in tar wastes. Organic vapour concentrations of tar at 1 $ug \cdot L^{-1}$ (ppb) are detectable by sense of smell.

Visual evidence of water pollution by oily and tarry wastes was also evaluated. Because of the immiscible and denser-than-water properties of tars and sludges, natural and manmade catch basins,

surface drainage ditches, storm water outfalls and natural seepage faces on soil and rock slopes were examined. Additional and important locations where these wastes may accumulate in developed areas are building sumps, tile drains and storm water sewers and sumps.

For former sites that have been developed, an effort was made to collect information or evidence of buried waste through soils reports, excavation reports and interviews with contractors associated with construction or redevelopment on or near the site.

2.3 PHASE 3 - ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACT

Assessment of potential environmental impact of each former industrial site was performed using a fact sheet that describes site conditions and qualitative assessment criteria. Active sites were not subject to assessment of potential environmental impact, although fact sheets describing site characteristics, evidence of buried wastes and resources characteristics were completed.

2.3.1 Fact Sheet Description

The fact sheet approach was adopted for the purpose of presenting all relevant site specific information in a format that is consistent and comprehensive. The fact sheet utilized in this study is given in Figure 2.2 and is similar to one used in the INTERA (1987) study of coal gasification plant waste sites. The fact sheet is structured into several categories based in part on assessment criteria. The categories include site location, site identification, site characteristics, evidence of buried wastes, resource characteristics, and comments including any information on off-site waste disposal areas. The entries to the fact sheet are mostly self explanatory; however, a brief description is appropriate.

Figure 2.2 Fact Sheet for Survey of Industrial Coal Tar Sites

1. Site Location:

City _____ Street Address _____

MOE Region _____ _____

MOE District _____ NTS Map Sheet _____

Historical Maps and Photos Available _____

2. Site Identification:

Name _____

Type of Facility _____

Operator(s) and Period(s) of Operation _____

3. Site Characteristics:

Size (when operated) _____

Present Land Use _____

Planned Land Use _____

Present Occupant(s) _____

Present Land Use Adjoining Properties _____

Underground Utilities _____

Figure 2.2 Continued

Soil Conditions _____

Site Access _____

4. **Evidence of Buried Wastes:**

Operating Period _____

Excavation History _____

Visible Wastes _____

Odour _____

Water Pollution _____

5. **Resource Characteristics:**

Surface Water _____

Proximity _____

Use _____

Groundwater, Proximity _____

Use _____

Proximity of Existing Wells _____

Site Investigations _____

6. **Comments/Remarks:** _____

Site location is documented in terms of regional and local address. Regional location is identified by Ontario Ministry of the Environment region and district as well as city or town and National Topographic Service map sheet number. Local address is given as a municipal address using street and number and/or bounding blocks. Local plant location is also given on a city street map and shown on an historical map. Available historical maps and early air photos are listed on the fact sheet.

Each site is identified by a name that usually refers to the plant facilities and by the type of facility and operator(s) and period(s) of operation of the facility.

Site characteristics include the size of the plant and property (areal extent when operating), present and planned land use, present occupants or owners, and land use of surrounding properties. Description of underground utilities, soil conditions and site access are also provided in this category.

The evidence of buried wastes category includes duration of operations (longer operating periods are likely to generate more wastes), the history of excavation at the site and any reported or observed visible or olfactory evidence of wastes. Evidence of water pollution is also included in this category.

The resource characteristics category include identification of natural resources, such as surface and groundwater resources in the area of each site that potentially may be impacted by waste migration. Historical or on-going site investigations that provide additional information on each site are also noted in this category.

A comments and remarks section is also provided to allow description of important aspects of the site not covered by previous categories and to describe the disposition of plant wastes off-site.

This disposal includes that undertaken during plant operation and later during excavation and redevelopment. For most plant sites, the location and extent of off-site waste disposal is not well known. Most off-site waste site locations are only tentatively identified. Because of this uncertainty and the likelihood that other industrial wastes may have been disposed at such sites, off-site disposal areas were not subject to assessment of potential environmental impact.

2.3.2 Criteria for Assessment of Potential Environmental Impact

The criteria for assessment of potential environmental impact of former sites are listed in Table 2.1 and are grouped into three important categories: site charactistics, evidence of buried wastes and resource characteristic as utilized previously in the INTERA (1987) report. The three categories are further divided into a number of factors which are used to assess the potential environmental impact of each site. The approach to assessment of potential environmental impact of unexplored industrial sites is qualitative in nature reflecting the variable, uncertain and conjectural nature of much of the data. Therefore, qualitative scores of high, medium, and low are assigned for each of the factors. For some sites, data is of greater reliability as a result of recent subsurface investigations, but for many of the sites reliable information on subsurface conditions is not available, or at best is poorly reported. Given these considerations, quantitative assessment or ranking of sites with respect to potential environmental impact is not warranted. Also not all factors are expected to have equal weighting at all sites.

The rationale and assessment criteria fo. each factor are provided in the following paragraphs.

Table 2.1 Assessment Criteria for Potentional Environmental Impacts of Former Industrial Sites Producing and Using Coal Tar and Related Tar in Ontario

Factors	Criteria for Assessment		
Level	Low	Medium	High
Site Characteristics			
Size (when operated)	<1.0 hectares	1.0-5.0 hectares	>5.0 hectares
Location	rural or sparsely populated	industrial or commerical area	residential or public use area
Current Use/Ownership	controlled access, industrial or commercial use	owned and used industrially or commercially with uncontrolled access	used residentially or publicly
Planned Use/Ownership	continued ownership and industrial or commerical use	sale for industrial or commerical use	sale or conversion to residental or public use
Potential for Excavation	no plans for redevelopment	possible redevelopment	redevelopment planned
Evidence of Buried Wastes			
Operating Period	<10 years	10-25 years	>25 years
Excavation History	excavation, no wastes reported	no excavation or unknown	excavation, waste encountered
Visible Tar Wastes	none or very minor	minor pockets	extensive
Odour	none on-site	minor on-site	distinct on-site
Water Pollution	no visible presence	oily or discoloured water on-site	oily or discoloured drainage off-site
Resource Characteristics			
Surface Water Proximity	>1 km	<1 km but not adjacent	adjacent
Surface Water Use	industrial	recreational	drinking water
Groundwater Proximity	site directly on low permeability soils or bedrock, no aquifer present	site on permeable soils with confining layer above aquifer	direct groundwater connection to major aquifer
Groundwater Use	no wells in possible impacted areas	industrial or a few private wells	public water supply wells

2.3.2.1 Site Characteristics

Size. This factor provides a good indication of the potential impact of a site in that a large site is more likely to be a problem than a small site. Large sites would tend to be associated with larger plants that would produce more waste and, therefore, have a greater potential for waste products to enter the environment. Large sites are considered to be greater than 5.0 ha (50,000 m^2) while small sites are less than 1.0 ha and these values represent the bounds for high and low scores.

Location. Plant locations are an important consideration in the assessment of a site because the location will determine the potential for human contact. Sites located in rural areas will have a low population density and, therefore, the potential population affected by a contaminant release will be small. Similarly, if the area is industrial or commercial, more people are likely to be affected. The highest ranking is given to a site that is now located in a residential or public use area.

Current Use/Ownership. This factor is used to assess public access and the potentially affected populations. If the site ownership is presently industrial or commercial, access may be limited and the potentially affected population is reduced. Conversely, if the site is residential or public, access will be uncontrolled resulting in a greater concern and a higher ranking.

Planned Use/Ownership. This factor considers the potential impact on future populations similarly to the current use/ownership factor. A high ranking is given to sites that have the potential for sale or conversion to residential or public use. Also a site planned for resale is, assuming all other considerations being equal, likely to be of greater concern from the standpoint of legal liability than a site that is not.

Potential for Excavation

This is an important factor in that it directly assesses the likelihood that buried wastes may be excavated and exposed and dispersed possibly through rupturing of underground tanks. From a health standpoint, wastes contained in tanks in the ground pose much less hazard than wastes exposed during excavation. Consequently, sites planned for redevelopment are of greatest concern whereas sites with no plans for redevelopment are of least concern.

2.3.2.2 Evidence of Buried Wastes

Operating Period. The time period over which the site was in operation can be used as an indicator of the magnitude of the waste problem. Sites with a long operating period will have generated more wastes and have a longer period of waste migration.

Excavation History. Excavation history is an important assessment factor in that it provides documentation as to the existence of buried wastes. The difficulty with this factor is that reporting of waste occurrence during past excavation is not consistent between sites. Sites with excavation and no reported wastes are of less concern than sites with no excavation which are in turn of less concern than sites where wastes were reported during excavation. The high criteria for this category is of additional concern in that excavation into sites containing wastes may have resulted in tank rupture and dispersal of wastes over a larger area.

Visible Wastes. This factor provides an assessment based on the visual identification of wastes from site inspections conducted as part of this study and from historical accounts. Sites with large areas of visible tar waste will present a greater hazard than those with no visible waste. Visible tar waste over a larger area will receive a high ranking.

Odour. Odours in the area of a site provide an indication of the presence and extent of wastes. With coal tar, oil tar and wood tar odours detectable in the ppb range, this method can provide a suitable site assessment method. Sites with distinct odours reported in the past or noticeable at present likely contain waste and are therefore of greatest concern.

Water Pollution. Presently visible or past reported surface water or groundwater pollution is an indication of an ongoing environmental impact and cause for concern. On-site ponded water that is oily or discoloured may be confined to the site property and receives a medium ranking. If the surface water or groundwater pollution is documented to have drained or seeped in the past or is suspected to be seeping presently to a surface water body, then the impact is more serious and a high ranking is recorded.

2.3.2.3 Resource Characteristics

Surface Water Proximity. The proximity of a site to a surface water body represents an important factor in the assessment of a site. A short distance to a river or stream results in a short travel distance for a contaminant release and therefore is an important assessment criteria. Sites adjacent to a surface water receptor are of greatest concern, whereas sites at distances greater than 1 km are of least concern.

Surface Water Use. If the surface water adjacent to a site is impacted by plant wastes, it is important to consider the use of the water within the potentially impacted area. Industrial use is unlikely to be affected by poor water quality but recreational or, more significantly, drinking water use represents a serious impact. Surface water in the area of the site used for drinking water is therefore of greatest concern.

Groundwater Proximity. The ease with which groundwater may be impacted depends on the permeability of subsurface materials and the distance to the water table. Sites located on low permeability materials such as clay or shale bedrock and that have no aquifer are unlikely to have extensive areas of groundwater contamination and warrant a low ranking. If the site overlies and is directly connected to a major aquifer, the potential exists for widespread migration of contaminants. In this case, sites would receive a high ranking. If the site is isolated from an aquifer by a confining layer, the aquifer has some measure of protection and receives a medium ranking.

Groundwater Use. Groundwater within the potentially impacted area that is used for public water supplies represents the most serious impact and therefore is of greatest concern and highest ranking. No groundwater use within the potentially impacted area is of least concern. A medium ranking is assigned to this factor if a few industrial or private wells are situated within the expected impact area.

2.4 PHASE 4 - DEVELOPMENT OF OPTIONS FOR FURTHER ACTION

Where appropriate, options for further action are developed for each site identified from Phase 1 activities. These options are developed based on site access, site conditions, the nature and disposition of wastes, the potential environmental impact associated with the wastes and perceived needs for additional information. The options for further action range from notifying and cautioning municipalities and land owners of the likely existence of buried wastes at each site to implementation of site investigations with the intent of resolving uncertainties in site characteristics and/or developing specific site remediation plans.

3. INDUSTRIAL PROCESSES AND PRACTICES

3.1 COAL TAR DISTILLATION

The first large scale distillation of coal tar began in 1838 in England and its product, then called creosote, was used for preserving timber. In the 1840s and 50s, the discovery of aniline dyes gave rise to an extensive coal tar distillation industry in Europe in the late nineteenth century which spread to America and to a modest degree to Canada as well. Canadian coal tar refiners and distillers, however could not compete with Germany and England in the manufacture of dyes and concentrated on the making of other coal tar products (Reynolds, 1918).

In Ontario the first refiners and distillers of coal tar obtained their raw material from "town gas" works. However it was only with the establishment of a by-product coke oven industry in Ontario (c1911) that coal tar distillation was put on a firm footing. The first refinery and distilling operation established in this regard was in association with the Algoma Steel Co. at Sault Ste. Marie and was later run by Dominion Tar and Chemical Ltd.

By 1920, the two principal distillers in the province were located in towns with ready access to coal tar produced by by-product coke ovens. Dominion Tar and Chemical in Sault Ste. Marie and Hamilton Tar and Ammonia in Hamilton. The leading products of Canadian coal tar distillers to the mid-1930s (see Figure 2.1) were roofing tars, road tars, crude creosote, crude carbolic acid, light oils, middle oils, timber preservatives, sheep dips, sprays, fungicides and insecticides. The light oils, occasionally some middle oils and many crude products were exported to foreign countries; there was no production of the higher grades of hydrocarbon compounds that could be obtained from these oils (Wilson, 1937).

Coal tar obtained by the distillers from gas works or by-product coke ovens was normally stored in covered vertical cylindrical steel tanks and occasionally stored in underground cisterns or wells constructed of brick or reinforced concrete.

In the early twentieth century, there were basically two methods of distilling tar in Canada: the vertical still and the horizontal still. Both stills were simple batch stills fitted with condensing arms at their heads from which various products of distillation were conducted into different receivers. By 1945, the technology of distilling apparatus had developed from simple batch stills with a capacity of 4000 to 10,000 gal of tar to sophisticated continuous tube stills of much greater capacity (30,000 - 100,000 gal of tar per day).

One or more of the following distillates are obtained when coal tar is refined by any of the primary distillation processes outlined above: light oil, middle oil, heavy oil (creosote oil) and anthracene oil (see Figure 2.1). These products may be further distilled in turn and separated into a wide variety of chemical substances. At the close of the primary distillation process, the residual product consists either of coal tar pitch, or else refined coal tar, depending on its physical characteristics. There is no sharp line of demarcation between the two, although, in general, residuals having a fusing point above 80°F are known as pitches, whereas those fusing below are considered refined coal tar. The characteristics of a given residual will vary with the nature of the tar, the particular method of distillation and the quantity of distillate removed.

When the distillation has been completed, the hot refined tar or pitch was run into coolers, and when the temperature fell to the desired level the product was either run into barrels or into a large rectangular concrete enclosure known as a "pitch bay", where it was allowed to solidify, later to be broken up and treated before use

(Abraham, 1945). These residuals comprised from 50 to 60% of the pre-distilled coal tar (Rogers, 1926). Barrels of refined coal tar and various grades of pitch were either used by the distillers themselves to manufacture items such as tarred felts, paving materials (tarvia), protective paints, etc. or sold to other businesses for similar uses.

3.2 CREOSOTING PLANTS

The use of coal tar creosote as a preservative for wood dates to the development of large scale coal tar distillation by Bethell in England in 1838 (Reynolds, 1918). The material was adopted by British railway engineers in the 1840s for the treatment of ties and timber bridges (Burt, 1852). In 1841 wood paving blocks impregnated with coal tar were first used in England. Indeed, both creosote and coal tar were used interchangeably or in combination for wood preservation from that time into the twentieth century (Canada Department of Mines, 1915).

Perhaps surprisingly, creosote was not used in Canada to any significant degree as a wood preservative for the treatment of railway ties, crossarms, poles, piles, mine timbers and wooden paving blocks until the 1920s. The first Canadian attempts to employ any type of wood preservative did not occur until early in the twentieth century. In 1910 plants were established at Fort Frances and Winnipeg to treat railway ties by a zinc-chloride-aluminum patent immersing system, another nineteenth century timber preservation method. By 1912 many pole-line companies had begun to use wood preservatives: one of several treatments they employed was to paint the butts of poles with creosote or hot tar to provide protective impregnation. About the same time, Canadian railway companies were beginning to realize the merits of treating wooden ties with preservatives. In 1912 a total of 1,818,189 of the railway ties used were chemically treated: this representated 8.5% of the total number of ties purchased in that year (Canada Forestry Branch Bulletin, 1912). Specialized creosoting plants emerged in conjunction with these developments.

By 1911 the Canada Creosoting Company Ltd. had opened a plant in Trenton, Ontario to produce creosoted railway ties, poles, crossarms, piles and wood paving blocks. In the years that followed, this company would establish three other plants in Ontario at Sudbury (1925), Sioux Lookout (1926) and Fort William (1940). In 1940, another firm - Northern Wood Preservers Limited - established operations in Port Arthur.

Creosoting plant operations were relatively simple. Large above-ground steel storage tanks were located on each site; these contained considerable quantities of the raw material for preservation treatment. This material could be creosote distilled from gas tar, wood tar, oil gas tar, producer gas tar or coke oven tar, but a mixture of coal tar and water gas tar distillates formed the bulk of the creosote used in North America by the 1920s. Refined tar (dehydrated tar) was also used by itself as a preservative material into the 1940s and perhaps later as well. Economy in the use of creosote was achieved by mixing it hot in the proportion of 80 parts creosote to 20 parts of tar and increasing slightly the pressure treatment time.

Well seasoned fabricated timber products were placed in a cylindrical steel vessel for treatment. This vessel was constructed in such a way that a vacuum could be obtained by pumping out the air. Creosote or creosote/tar oil previously heated to 35° - 50°C was allowed to enter the exhausted vessel. A pressure of between 100 and 180 psi was then applied by pumps to effect better penetration of the preservative and dehydration of the wood.

After an appropriate time had elapsed, the treated timber products were removed from the vessel and stored, awaiting shipment to creosoted timber suppliers or directly to users.

A flow chart of a typical modern wood preserving facility is shown in Figure 3.1.

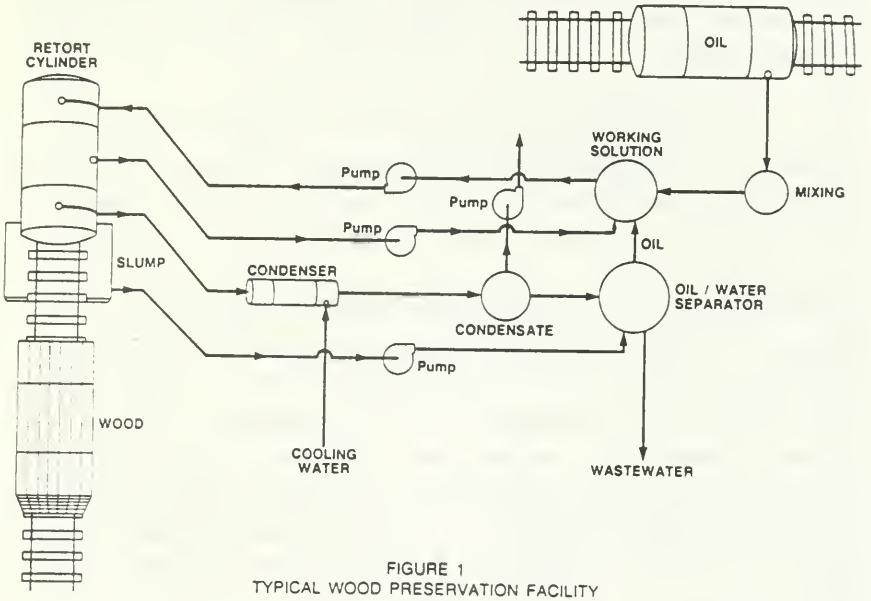


FIGURE 1
TYPICAL WOOD PRESERVATION FACILITY

Drawn by	Date
Checked by	Date
Revisions	Date

Flow chart for a typical wood preservation facility (after Bérand and Tseng, 1986)

INTERA Technologies

Figure 3.1

3.3 ROOFING FELT AND TARRED PAPER PRODUCTS MANUFACTURERS

Paper impregnated with tar and "tarred board" were used for roofing purposes in Germany as early as the 1820s. The first major commercial use for coal tar was in the manufacture of roofing felt, also a German discovery, which followed upon the erection of the first coal tar distillery in Germany in 1826 (Reynolds, 1918).

Tar impregnated composition or prepared roofing was introduced in the United States in the 1840s. In 1844-45 roofs were reportedly laid in Newark, N.J. which consisted of square sheets of ship's sheathing paper treated with a mixture of pine tar and pitch, and surfaced with sand. In 1847 Cyrus M. Warren used coal tar as a substitute for pine tar to soften the pine pitch and as a saturant for the paper. Square sheets were dipped by hand at first but soon machinery was devised for running the paper or felt in rolls through continuously operating saturators. Finally, in Buffalo, N.Y. coal tar was distilled down to a roofing pitch which was used to replace the more expensive mixture of pine pitch and coal tar. Before the end of the century, tarred roofing felt and paper making had become a major branch of the coal tar industry in America (Abraham, 1945; Lunge, 1916).

It is not known precisely when tar impregnated roofing felt or paper was first made in Canada, but it is not unreasonable to conjecture that it was shortly after the mid nineteenth century, recognizing that the building material had been used in America from the 1840s. Even so, it is unlikely that machine production on a significant scale was introduced before the last two decades of the century. The Paterson Manufacturing Co. of Toronto was one Ontario firm that began tarred roofing felt production in that period.

While never as large an enterprise as in the United States, the tarred roofing felt and paper industry of Canada grew in the 1920s and continued into the 1950s. Ontario manufacturers included firms that were refiners and distillers of coal tar, and those that were makers of building products. Currie Products Ltd. in Hamilton and Ottawa was an example of the former, Building Products Ltd. (Bird & Son Division) of Hamilton a case of the latter. The trade used both asphalt and tar as materials for impregnating felt and paper. In 1937 Canadian manufacturers consumed some 392,203 gallons of tar. During the 1930s, the chief tar using products were saturated rag felts and sheathings, building and roofing paper, liquid roof coatings and related products such as road materials.

Saturating compositions for impregnating felt included coal tar, water-gas tar and oil gas tar used either singly or in various combinations, or tempered to the proper consistency with corresponding pitch obtained by distilling the tar to expel the highly volatile oils. Tar products were used for manufacturing single-layered felt for construction "built-up" roofings and waterproofing membranes, and for manufacturing multiple-layered prepared roofings. Mixtures of tars and asphaltic products were also used. By the mid 1940s, the saturants most commonly used included soft coal-tar pitch, residual oil, soft residual asphalt and soft blown petroleum asphalt. Building paper was also impregnated with tar in the early 20th century, but by the 1940s coal tar pitch or asphalt were the more common substances (Abraham, 1945). In the mid to late 1950s, petroleum asphalt became the dominant saturant in prepared roofings.

Felted fabrics were imgregnated with tar or pitch saturating mixtures by one of the following procedures: 1) by running the preformed web through a tank of molten saturant, and impregnating it in an open or closed tank through a variety of processes at atmospheric pressure, in a vacuum or under pressure; 2) by subjecting the freshly formed web of felt, just as it comes off the felt machine, and while it

is still wet, to the highly heated saturant, for the dual purpose of expelling the mositure and impregnating the felt; 3) by grinding or otherwise mixing fibrous substances with the saturant and then rolling the mass into sheet form between rolls, or else running the aqueous mixture over the felt machine; and 4) by first converting the saturants into an aqueous dispersion and adding the emulsion to the aqueous suspension of fibres in beaters, and then precipitating the tar on the fibres, after which the sheet was formed on a felt machine.

By the 1940s the method usually employed consisted of treating the preformed web with the melted saturant at atmospheric pressure. The "modern" apparatus for producing tar-saturated fabrics in this manner included a large saturator tank filled with tar which was fitted with a sump to catch overflow saturant which in turn was pumped to storage tanks for re-use. Early saturators were probably more crude, with a lot of tar being spilled in the saturation process. Building paper was saturated by a machine similar to that used for manufacturing tarred roofing felts. The web was saturated by running it through a tank of melted saturating material, usually heated by steam.

3.4 BY-PRODUCT CHARCOAL AND COKE OVEN PLANTS OF THE IRON AND STEEL INDUSTRY

Charcoal and coke were both used as blast furnace fuels for the iron and steel industry in Ontario. Charcoal iron works pre-date iron and steel plants in Ontario.

The province's first charcoal ironwork was at Furnace Falls (Lyndhurst) c1800-1802: it was followed by others at Normandale in 1817, 1822-47, Marmora in 1820-48, 1856 and 1866 and Madoc in 1836. A combination of the abundance and accessibility of wood in the province, and the high cost of importing coal or coke, ensured that some Ontario ironworks continued to use charcaol as a blast furnace fuel into the twentieth century.

The early charcoal kilns established to service ironworks in Ontario were not by-product kilns and therefore did not recover wood tars and oils in the combustion process. By-product kilns first appeared in the later 1880s when the E.W. Rathbun Co. of Deseronto built a hardwood distillation works. Rathbun's enterprise expanded to charcoal making in 1898. Later re-organized and known as the Deseronto Iron Company (1899-1912), then the Standard Iron Company (1912-1919), the ironworks used charcoal as a blast funace fuel exclusively to 1906 and partially 1909 to 1917. The 1903 by-products of this facility included wood alcohol, acetate of lime, acetic acid, tar oil, wood pitch and wood creosote.

Two other charcoal ironworks also existed briefly in Ontario in the twentieth century. Charcoal was used for six months to fuel blast furnaces at the ironmaking plant of the Algoma Steel Co. in Sault Ste. Marie in 1905. It was also used at the Standard Iron Co. of Canada (later Parry Sound Iron Co.) from 1915 to 1919. The charcoal production of both plants was associated, as in the case of Rathbun's earlier enterprise, with hardwood distillation works (see Section 3.6).

Coal tar produced as a by-product in the making of coke which was the principal fuel in the operation of blast furnaces. The first by-product coke ovens in Ontario began operation at the Algoma Steel Co. works, Sault Ste. Marie, in 1911. By 1919 the Steel Company of Canada in Hamilton was also engaged in the production of tar from by-product coke ovens. Together in that year, the two companies produced over 7.5 million gallons of coal tar.

Indeed, by far the greater part of the Canadian output of the material following World War I came from by-product coke ovens whereas formerly it had come chiefly from illuminating and fuel gas manufacture. Low temperature coke ovens yielded more tar per ton of

coal than gas producing retorts. In 1919 by-product coke ovens in Canada produced 11.6 million gallons as against only 6.4 million gallons from the illuminating and fuel gas (city gas) industry.

During January 1924 operations were begun at a third plant - the Hamilton By-Products Coke Ovens Ltd. - although it was not associated with the iron and steel industry. This site also produced coal gas for municipal consumption and was discussed in the "town gas" inventory report (INTERA, 1987). Initially it produced four to five thousand gallons of tar per day. By-product coke ovens in Ontario were to continue to lead production in coal tar into the late 1930s, and probably thereafter as well. In 1951 a by-product coke oven plant was opened with the establishment of the Dominion Foundries and Steel Co. Ltd. at Hamilton.

A number of different types of by-product coke ovens were used but the method of collecting and storing tar was essentially the same. The principal by-products of coking operations were coal tar, ammonia liquor and gas. Tar and ammonia liquor were collected from coolers and tar extractors and separated in separating tanks. The tar was stored in above-ground tanks; these were usually elevated vertical iron cylinders of comparatively large diameter. Tar "drip tanks" for coolers and extractors were subterrainean. Ammonia liquor was distilled to produce free ammonia. The waste liquor from this process, which would have contained some tar, was run into a sewer. Free ammonia then passed into the gas and was carried to a saturator where ammonium sulphate was recovered.

It was customary to dehydrate coal tars at their point of production to avoid paying freight charges on water content. In most cases, tar storage tanks were equipped with a steam coil in the bottom for this purpose. Other methods of dehydrating coal tar included settling in storage tanks, use of centrifuges, horizontal stills, tube heaters, cascading and steaming the tar, and spraying the tar into

water. Tar was transported to distilleries or other customers by rail in special tank cars or by water in barges. Where coal tar producers were close to distilling plants it was sometimes moved in pipelines.

Iron and steel plants could produce tar by other means and these deserve brief mention. For a few years the Algoma Steel Co. at Sault Ste. Marie operated an extensive water gas plant to produce auxiliary fuel for its pyrrhotite ore roasting works, but this was discontinued by 1907. The manufacture of water gas is based on the decomposition of steam by incandescent coke or anthracite. It is usually enriched with a petroleum oil heated to a gaseous state and mixed with water gas. The heavier vapours from the oil later condense on cooling and form the water gas tar, which in reality is an oil tar.

The Algoma Steel Co. also had a producer gas plant in association with the open hearth steel department which began operation in 1907. Eight gas producers were situated immediately behind the open hearth building. Producer gas plants burned raw coal at low heat and the process yielded tar which could be recovered as a by-product. The gas was used to fuel the open hearth furnaces and to dry out the ladles which carried the molten steel after these had been repaired and made ready for reuse.

In addition to producing coal tar and ammonium sulphate from liquors derived from tar extractors, by-product coke oven plants also stripped the gases from coal burning for the recovery of benzene, toluene, xylene, solvent naptha and naphthalene. Some of these products in addition to coal tar were refined by Canadian producers for sale, but several producers sold their tars to treating works; some tar was burned under boilers at the plant, and some was used locally for waterproofing in building, road works, and similar situations.

3.5 INDUSTRIAL MANUFACTURED GAS PLANTS

Manufactured gas plants had a variety of industrial uses in Ontario and date from as early as 1880 to as late as 1969. Gas was manufactured from coal, coke and oil for use as industrial heat and light, metal refining and railway car lighting. In all of these gasification processes tars were generated in the combustion process and removed during condensing and gas purifying operations.

The process of manufacturing gas by superheating oils began about 1850 in Germany when Julius Pintsch produced the first compressed oil gas we now know as "Pintsch" gas. For a time, this gas was used to light buoys and wayside railway stations. Its major use, however, was as an illuminant for railway carriages in both Europe and North America. Europeans employed gas from shale and lignite in this process. North Americans used refined petroleum oils.

Pintsch or oil gas tar is similar to water gas tar: it contains small quantities of benzol and toluol and a large amount of napthas, some naphthalene, little or no anthracene and phenols (Rogers, 1926). Even as late as 1916 oil gas tar was considered a troublesome by-product. Its composition was not determined exactly and the tar varied significantly with the raw materials and the apparatus employed. Oil gas tar was sometimes worked up by distillation. The residue was used as a substitute for natural asphalt and the pitch was employed as a base for black enamel or varnish. Large quantities of oil tar were burned as a fuel at gasworks (Lunge, 1916).

Pintsch or oil gas manufacture was not an extensive industry in Canada. Ontario production appears to have been largely restricted to the plants of the Pintsch Compressing Co. Ltd. which began operations at Toronto and North Bay around 1910 and continued until the late 1950s and smaller industrial plants such as the gas plant of the Preston Woollen Mills, Preston. Pintsch Compressing Co. gas was used for lighting railway passenger cars.

Some companies providing municipal heat and light also constructed oil gas plants as part of their auxiliary operations. Among these plants were those located on company sites which also employed the coal gasification process and were covered as part of the previous inventory study. The Union Natural Gas Co. of Canada also employed a Dayton process oil gas plant as an auxiliary to its natural gas plant in Windsor.

Pintsch or oil gas plants were smaller in scale than works for the production of coal gas. The gas was manufactured by spraying gas oil derived from petroleum (usually fuel oil) in a closed retort constructed of iron or fire clay and heated to a temperature of 900 to 1000°C by the combustion of oil, gas or tar underneath. Vapours passed to the rear of the horizontal retort, then downward and through a scrubber, condenser and purifier. Tarry matter deposited in the hydraulic main, condenser, etc. was conveyed by means of pipes into tar tanks, usually above-ground cylindrical steel vessels. About 10% tar is recovered in the Pintsch process. Some of the tar was used to fire the plant's retorts while some was sold to distillers and shipped in cylindrical steel railway cars as is the case with the coal tar from by-product coke oven works.

Industrial manufactured gas plants based on coal and coke were also identified in this study. The Algoma Steel Co. operated a water gas plant and a producer gas plant during early operations (1907 - 1930s) (see Section 3.4). The Inco Ltd. Port Colborne Refinery also used a water gas producer in the refinery process. The gas producer was small and generated gas by passing steam through heated coke. By-product tars from the Inco gas plant were burned on-site as fuel. The Algoma gas plants are not discussed further in this report because they are now part of the Algoma Steel Mill complex. The Inco gas producer is also not considered to be an important site in this report.

Two industrial coal gasification plants were identified in this study, the American Cyanamid Co. fertilizer works in Niagara Falls, Ontario and the Ford Motor Co. site in Windsor (Walkerville), Ontario. The operation and purpose of the Cyanamid manufactured gas plant is not known although, it is likely that both the gas and by-products (coke and ammonia) of the gas plant were used in the manufacture of calcium cyanamide fertilizer. Calcium cyanamide is produced by reacting coke and lime in an electric furnace in the presence of nitrogen.

The Ford Motor Co. coal gasification plant was also a coal tar distillation plant. The plant used the manufactured gas in heating and forging operations, the sulphate of ammonia as a fertilizer, the benzol and heavy oils as fuel. Creosote was sold for timber preserving. The Ford Motor Co. distillation plant utilized a comparitively low distillation temperature which resulted in greater recovery of volatiles and larger tar yields per ton of coal.

3.6 WOOD DISTILLATION

The term wood distillation can be applied to both the distillation of hardwood and the distillation of resinous wood or softwood. Both types of wood can be distilled using a destructive distillation process, although softwood can also be processed using a steam distillation and extraction method.

Pine tar was the earliest and most important product of softwood distillation in Canada. It was made in tar kilns or tar pits without any attempt at other by-product recovery, similar to the manner in which charcoal was made. The major use of pine tar was as a component in the early manufacture of cordage (tarred rope and twine). Even so, the distillation of softwood did not become a significant activity in Canada, and is of little interest to this study. In consequence, the following comments address the destructive distillation of hardwood only.

The first successful commercial distillation of hardwoods in North America occurred in New York State in 1850; its principal product was acetate of lime (Hawley, 1923). During the 1880s, E.W. Rathbun opened Ontario's first hardwood distillation plant at Deseronto. In 1889 the plant consisted of eight beehive kilns with a capacity of 50 cords of wood each, which yielded "4 coal oil barrels of liquid" per cord. The destructive distillation of hardwood normally yields 18 to 20 imperial gallons of tar per cord (Canada, Department of the Interior, 1922) (see Figure 3.2). The principal early products of Rathbun's plant were listed as charcoal (75,000 bu), wood alcohol, acetate of lime, sugar of lead and "liquors used in dyeing". No mention was made of tar as a product; presumably it was used to fuel the kilns and/or run to waste. Rathbun established an ironworks at Deseronto in 1898 and used the charcoal as a fuel in its blast furnaces. These works operated on charcoal until 1917 and it is probable that the wood distillation plant closed soon after charcoal was abandonned as a blast furnace fuel since no record has been found to confirm its existence after that time.

By 1910, seven more hardwood distillation plants had been opened. These were located in Sault Ste. Marie, South River, Fenelon Falls, Longford, Parry Sound, Donald and Thornbury. Two more, in Trout Creek and Lindsay, were started before 1922. Most of these plants were located in rural areas and the majority of them were also either established or absorbed by the Standard Chemical Company of Canada. Hardwood distillation became a major industry during World War I when the demand for acetone for the manufacture of cordite provided new impetus for growth. With this base, the industry continued to flourish in the 1920s and 1930s, and lasted in some cases into the late 1940s.

During the sixty year period the wood distillation industry operated in Canada, there were three changes in the technology it employed. Brick beehive by-product kilns were used in the 1880s in Rathbun's early Deseronto plant. In the 1890s these were superceded

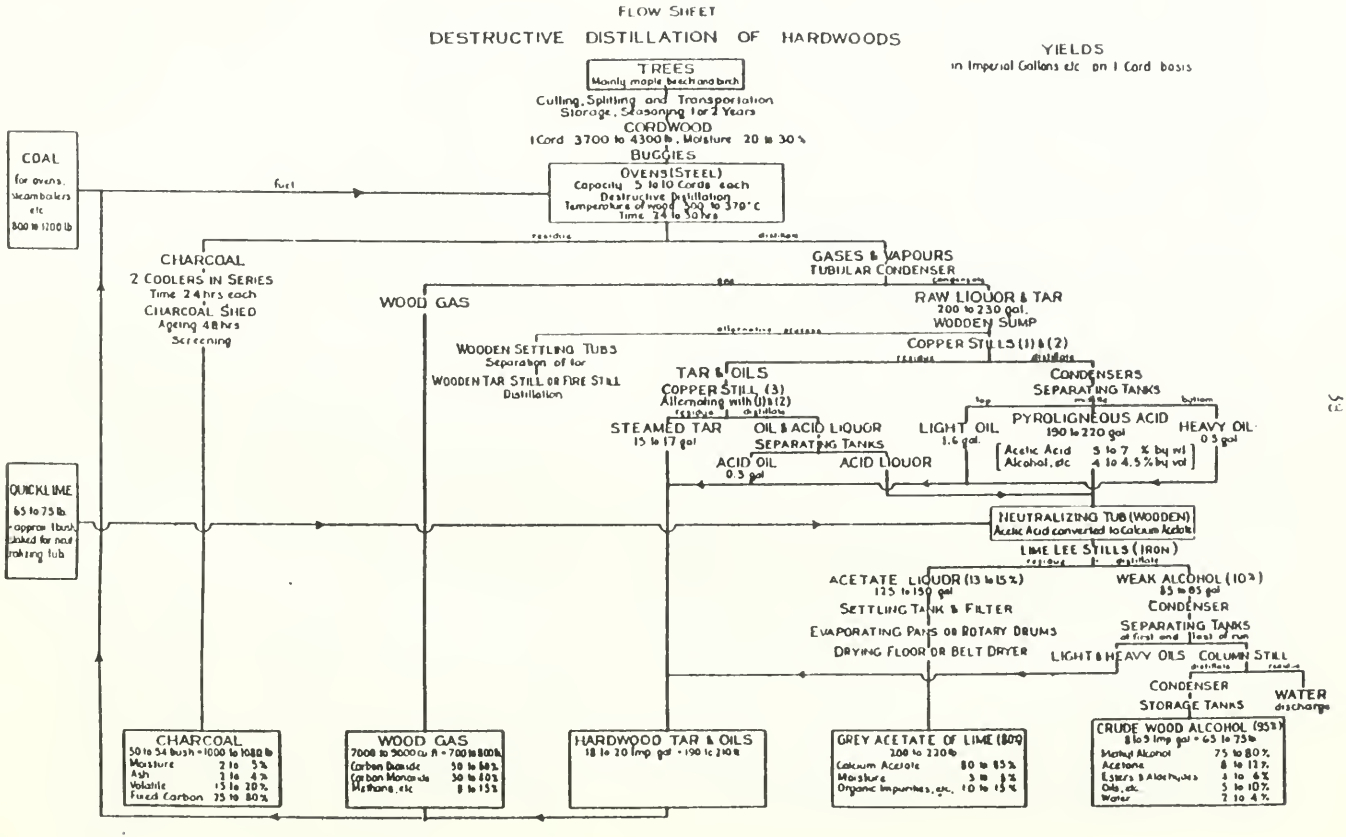


Figure 3.2 Flow sheet - destructive distillation of hardwoods (after Canada Department of the Interior, 1922)

by retorts - initially horizontal retorts made of cast iron, then later cylindrical steel retorts. From about 1900, rectangular steel ovens known as "Jumbos" (to distinguish them from the older, smaller cylindrical retorts) were adopted as standard equipment in Canada. By the 1920s, the oven capacity of individual Jumbos in operation in Ontario ranged from 5 to 10 cords a day, with the total capacity of operating plants ranging from 20 to 112 cords a day. This progression of technology from kiln to retort to oven substantially increased the efficiency of destructive distillation activities. It did not, however, alter the basic process which in all cases remained condensation of the gaseous products of wood burning.

Raw liquor from the oven's condenser was often pumped to a series of wooden tanks to allow the tar to settle so that the tar from the bottom of the tank could be drawn off to a wooden tar still for refining by steam distillation. It was common practice in Canada, however, to feed the whole raw liquor directly into the primary copper stills which had a capacity (in the early 1920s) of 3,000 - 4,000 gallons. The liquor was fed continuously to the tar stills where alcohol, acid water and impurities were separated by distillation from the free and dissolved tar. The tar residuals, in turn, were drawn off to a storage tank (construction not known, but likely wood). Ordinarily, this tar was used to heat the steam boilers for the stills or used elsewhere at the plant as a fuel (Canada Department of Interior, 1922). In the early 1920s, the markets for hardwood tar and its derived products were not well established in North America.

Some outlet was beginning, nevertheless, for the products of fractional distillation of hardwood tar in the production and sale of beechwood creosote for use in the pharmaceutical industry, for wood preservatives (both tar and creosote), oils for ore floatation in the mining industry, binders for briquetting, pitch for roofing felts, lubricating mixtures and certain chemical derivatives (Hawley, 1923).

Even so, tar was not recorded in the reports of the Dominion Bureau of Statistics on the hardwood distillation industry for the entire period 1917 to the 1940s, although creosote was identified as a product from 1927. One suspects that before the 1920s and perhaps after, tar surplus to fuel requirements at hardwood distillation plants was run to waste, since considerably more was produced than could be used.

4. COAL TAR AND RELATED TARS

Coal tars, oil tars and wood tars are all generated by the incomplete combustion of carbon-based materials and the recovery and condensation of the gaseous products of such combustion. As such the tars associated with coal tar distillation plants, creosoting plants, roofing felt and tarred paper product manufacturers, by-product charcoal and coke ovens, industrial manufactured gas plants and wood distillation plants have generally similar physical and chemical characteristics and therefore similar environmental behaviour and health effects. The exact chemical and physical properties of a particular tar will be determined from the type of raw materials, the temperature and type of combustion or distillation process and the efficiency of condensing, exhausting and purifying operations.

4.1 CHEMISTRY AND ENVIRONMENTAL BEHAVIOUR OF TARS

The major chemicals associated with coal, wood and oil tars that may pose an environmental concern are:

- Polynuclear Aromatic Hydrocarbons (PAH);
- Phenolics;
- Light Aromatics (e.g., benzene, toluene, xylene).

These compounds are present in tars, sludges and liquors derived from coal, wood and oil. Table 4.1 shows the physical and chemical properties of typical coal tar constituents and the typical chemical composition of a coal tar. Oil and water gas tars are generally similar to coal tars but contain smaller amounts of nitrogeneous PAH, benzol, toluol, anthracene and phenol and larger amounts of napthas (Rogers, 1926). Wood tars are also similar to coal tars except that they contain only small quantities of ammonia, naphthalene and paraffin (Klar, 1925).

Table 4.1 Physical and Chemical Properties of Typical Coal Tar Constituents

Constituent	Formula	Molecular Weight	Aqueous Solubility (mg/L)	Log K_{ow}[6]
PAH				
Naphthalene	$C_{10}H_8$	128.16	31.7[1]	3.37
Acenaphthylene	$C_{12}H_8$	152.21	3.9[5]	-
Acenaphthene	$C_{12}H_{10}$	154.21	3.93[1]	4.33[8]
Fluorene	$C_{13}H_{10}$	166.21	1.98[1]	4.12[5]
Anthracene	$C_{14}H_{10}$	178.22	0.073[1]	4.45
Phenanthrene	$C_{14}H_{10}$	178.22	1.29[1]	4.46
Fluoranthene	$C_{16}H_{10}$	202.26	0.26[1]	-
Pyrene	$C_{16}H_{10}$	202.24	0.135[1]	4.88[5]
1,2-Benzoanthracene	$C_{18}H_{12}$	228.28	0.014[1]	5.61[7]
Chrysene	$C_{18}H_{12}$	228.28	0.002[1]	5.61[7]
Benzo(a)pyrene	$C_{20}H_{12}$	252.30	0.0038[1]	6.04[7]
3,4-Benzofluoranthene	$C_{20}H_{10}$	252.32	0.0015[2]	6.7[8]
Benzo(ghi)perylene	$C_{22}H_{12}$	276.34	0.00026[1]	7.23
Indeno(1,2,3-cd)pyrene	$C_{22}H_{12}$	276.34	0.0002[2]	-
Dibenz(a,h)anthracene	$C_{22}H_{14}$	278.00	0.0005[4]	5.97[8]
Light Aromatics				
Benzene	C_6H_6	78.11	1780.[3]	2.13
Toluene	C_7H_8	92.13	538.[3]	2.69
Ethylbenzene	C_8H_{10}	106.16	159.[3]	3.15
Phenolics				
Phenol	C_6H_5OH	94.	82000.[6]	1.46
Meta-Cresol	$CH_3C_6H_5OH$	109.	23500.[6]	1.98

Notes:
[1] Data from Mackay and Shiu (1977)
[2] Data from NBS (1981)
[3] Data from McAuliffe (1963)
[4] Data from Pearlman et al. (1983)
[5] Data from Lyman et al. (1982)
[6] Data from Verschueren (1983)
[7] Data from USEPA (1980)
[8] Data from Versar (1979)

Polynuclear aromatic hydrocarbons are compounds consisting of two or more fused benzene rings. The physical and chemical properties of PAH are dependent on the structure of individual compounds. The aqueous solubility and volatility of each compound decreases as the molecular weight of the compound increases. Therefore those compounds with a simple structure have higher solubilities and volatilities than those with a complicated structure. PAH are strongly adsorbed and immobilized in soils and are also susceptable to biodegradation by microorganisms. Table 4.1 also lists the logarithm of the octanol-water partitioning coefficient, K_{ow}, which is a measure of the partitioning of tar constituents between the water and soil. Larger K_{ow} values indicate a greater affinity for adsorption. As a result of these properties, PAH tend to be relatively immobile in the environment. However, the fact that they occur in tars and that tars can migrate as an immiscible, heavier-than-water phase increases their mobility and potential environmental impact.

Light aromatics, such as benzene, xylene and toluene are moderately soluble, and biodegradeable with high volatility and low sorption. They are expected to be relatively mobile in groundwater systems. However, the presence of these compounds will be largely determined by their volatilty.

Phenolics (e.g., phenol, cresol and xylenol) are highly soluble with low sorption and high biodegradeability and therefore are expected to be highly mobile in groundwater.

4.2 HEALTH EFFECTS

The environmental impact and risk associated with tars and tar wastes are derived from exposure and/or contact with hazardous substances. The hazardous substances of primary concern are polynuclear aromatic hydrocarbons and light aromatic hydrocarbons. The environmental impact from these substances results in adverse effects

on human health and aquatic and terrestrial ecosystems. The most adverse effect associated with PAH and light aromatic hydrocarbons, is the increased incidence of cancer (ERT, 1984). Health effects associated with PAH are documented in the literature because of their ubiquitous presence in the environment. PAH are found in polluted air, tobacco smoke, cooking products, soots, tars, and oils. PAH are formed in a variety of hydrocarbon combustion processes routinely exposing most people to very low levels of PAH. In general, PAH are a large group of chemicals of which only a few have been suitably tested with respect to human health effects. The major routes of PAH adsorption are through inhalation and cutaneous exposure (Occupational Health Program, McMaster University, 1986).

The carcinogenic activity of various PAH is given in Table 4.2 from ERT (1983). In general, the toxicity of PAH in various species increases as the molecular weight of the compound increases. This effect is tempered somewhat by differences in solubility in that the heavier compounds are less soluble and, therefore, less mobile in aqueous environments. PAH are noted to bioaccumulate in animal tissue of aquatic organisms and also are accumulated by adsorption in plants. The adsorption tends to be onto root surfaces as opposed to into the plant structure and, therefore, does not accumulate in the plant itself.

Single ringed, light aromatic hydrocarbons found in coal, oil and wood tars generally consist of the toxic compounds benzene, toluene, xylene and ethylbenzene. Of these compounds, benzene is the most toxic because of its carcinogenic health effects (USEPA, 1980a). The common method of human exposure is by inhalation due to the volatile nature of the light aromatics.

Chronic exposure to benzene has the most serious health effects of the light aromatics because of its increased risk for the development of leukemia (ERT, 1984). All of the light aromatic

Table 4.2 Carcinogenic Activity of Some Unsubstituted Polycyclic Aromatic Hydrocarbons (ERT, 1983)

Compound	Activity
Acenaphthylene	-
Anthanthrene	-
Anthracene	-
Benzo[a]naphthacene	-
Benzo[a]pyrene	+ (c,d)
Benzo[a]fluorene	-
Benzo[b]chrysene	-
Benzo[b]fluoranthene	+ (c,d)
Benzo[b]fluorene	-
Benzo[c]chrysene	+
Benzo[c]fluorene	-
Benzo[c]phenanthrene	+
Benzo[e]pyrene	-
Benzo[g]chrysene	+
Benzo[ghi]fluoranthene	-
Benzo[ghi]perylene	+
Benzo[j]fluoranthene	+ (c)
Benzo[k]fluoranthene	-
Benz[a]anthraceoe	+ (c,d)
Chrysene	+ (c)
Coronene	-
Dibenzo[a,e]pyrene	+ (c,d)
Dibenzo[a,h]pyrene	+ (c,d)
Dibenzo[a,i]pyrene	+ (c,d)
Dibenzo[a,j]naphthacene	-
Dibenzo[a,l]pyrene	+
Dibenzo[b,g]phenanthrene	-
Dibenzo[b,k]chrysene	-
Dibenzo[de,qr]naphthacene	-
Dibenzo[e,l]pyrene	-
Dibenz[a,c]anthracene	-
Dibenz[a,h]anthracene	+ (c,d)
Dibenz[a,j]anthracene	-
Fluoranthene	-
Fluorene	-
Hexacene	-
Indeno[1,2,3-cd]pyrene	+ (c,d)
Naphthacene	-
Naphthalene	-
Naphtho[2,3-b]pyrene	-
Pentacene	-
Pentaphene	-
Perylene	-
Phenanthrene	-
Picene	-
Pyrene	-
Tribenzo[aei]pyrene	-
Triphenylene	-

[a]Data from Sheer, 1938, 1941; Arcos and Argus, 1974; Dipple, 1976; Santodonato et al., 1981

[b]Symbols: + complete carcinogen by either skin painting, subcutaneous injection, intramuscular injection, intravenous injection, intraperitoneal injection, intratracheal instillation, oral administration to mammals
- negative in animal bioassay

[c]Compounds classified as "having substantial evidence of carcinogenicity" by the U.S. EPA Carcinogen Assessment Group (U.S. EPA, 1980b). The CAG list also includes two alkylated PAH (7, 12-dimethylbenz(a)anthracene and 3-methylcholanthrene), as well as "coal tar and soot", "coke oven emissions (polycyclic organic matter)" and "creosote".

[d]Compounds classified as showing "sufficient evidence" of carcinogenicity for animal carcinogens by the International Agency for Research on Cancer.

hydrocarbons affect the central nervous system with acute symptoms including headache, dizziness, fatique, nausea, unconsciousness and coma.

In aquatic ecosystems, the light aromatic hydrocarbons are moderately toxic to fish and lower species. Toxic levels of benzene, toluene, and xylene generally range from 1 to 100's of $mg \cdot L^{-1}$. For example, rainbow trout was found to have an LC-50 (lethal concentration for 50 percent of the population) of 5.3 $mg \cdot L^{-1}$ for benzene (USEPA, 1980a).

A recent Ontario Ministry of Labour sponsored study, (Occupational Health Program, McMaster University, 1986) provides a comprehensive review of the available scientific evidence relating to health effects of coal tar and other substances which contain polynuclear aromatic hydrocarbons. This study concludes that there is sufficient evidence concerning human carcinogenic potential of coal tar products in the literature to warrant stringent control of workplace exposures. This study recommends an interim standard for occupational exposure to volatiles of coal tar products at 0.05 mg/m^3 (cyclohexane soluable extract) time weighted over an 8 hour working day and zero dermal exposure.

5. RESULTS

5.1 LIST OF INDUSTRIAL SITES PRODUCING AND USING COAL TAR AND RELATED TARS IN ONTARIO

The study approach described in Section 2 identified 44 plant sites in 25 different communities in Ontario. Thirty-five former sites and nine active sites were identified. Active sites included four coal tar distillation plants, one creosoting plant and four by-product coke ovens of the iron and steel industry. The distribution of these former and active plants in Ontario is shown on Map 1 in Volume II of this report. Table 5.1 presents a list of these sites by industrial operation with their location and approximate years of operation.

Site specific information collected on each site listed in Table 5.1 is presented in the appendices contained in Volume II of this report. The information is arranged in a consistent manner for each site with each appendix containing the following:

- location map;
- historical plant map;
- fact sheet.

The location map identifies the location of the plant in the community on a small scale map. The historical map illustrates the configuration of the plant typically in its largest extent and locates the plant relative to existing streets. Other historical maps and early air photos available for each site are listed on the fact sheets. Detailed information regarding property occupants is given on the fact sheets. The fact sheets, described in Section 2.3.1, contain the factual information on each site. Most of the information collected on each site has been condensed onto the fact sheet in order to provide as complete a description of each site as is possible.

Table 5.1 List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario

Community	Company	Address	Approximate Years of Operation
Coal Tar Distillation Plants			
Hamilton	Currie Products	350 Wentworth St. N.	1978-present
Hamilton	Dominion Tar and Ammonia, Hamilton Tar & Ammonia, Hamilton Tar Products, Currie Products	East side Caroline between Mulberry & Sheaffe Sts.	1901-1977
Hamilton	Dominion Tar & Chemical, Domtar Chemicals	West side Strathearne Ave. north of Burlington St.	1950s-present
Ottawa	Hamilton Tar Products, Currie Products	170 Lees Ave.	1922-1948
Sault Ste. Marie	Dominion Tar & Chemical, Domtar Chemicals	South of Baseline (Wilde Ave.) and Dryden	1911-present
Thunder Bay (Port Arthur)	Northern Tar & Chemical, Northern Wood Preservers	2nd Ave. & Water Front S. (Maureen St.)	1938-present
Toronto	Barrett Co.	675 Lakeshore Blvd. E.	1922-1960s
Toronto	Dominion Tar & Chemical/ Domtar Chemicals	801 Lakeshore Blvd. E.	1925-1974
Toronto	J.D. Paterson Co./ Barrett Co.	5-33 Hahn Place	1900-1922
Toronto	Imperial Varnish & Colour	North side Lakeshore Blvd. E. between Logan and Morse Sts.	1900-1960
Windsor	Ford Motor Co.	Between Riverside Dr. E. and Wyandotte, west of Belle Isle (Belleview)	1923-1950s

Table 5.1 List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
Creosoting Plants			
Sioux Lookout	Canada Creosoting Co. Calder Creosoting Co.	1.6 km east of First Ave.	1928-1960
Sudbury	Canada Creosoting Co. Domtar Chemicals	South side Lorne St. Between Sutherland & Bulmer Sts.	1925-1964
Thunder Bay (Fort William)	Canada Creosoting Co. Dominion Tar & Chemical	North of Carpenter St. East of 105th St. on McKellar Is.	1940-1946
Trenton	Canada Creosoting Co., Domtar Chemicals	126 Marmora St.	1913-present
Roofing Felt and Tarred Paper Products Manufacturers			
Brantford	Brantford Roofing Co.	22 Sydenham St.	1906-1950s
Cornwall	Domtar Construction Materials Ltd.	Northwest corner Seventh & Cumberland Sts.	1940-1968
Hamilton	Building Products Ltd./ Bird and Son Division	70 Beach Rd. at Gage	1910-1954
London	Canadian Roofings Ltd./ London Roofings/Viceroy Manuf./Bishop Asphalt Papers	1350 Trafalgar Rd.	1939-1957
Toronto	Paterson Manufacturing Co.	297-307 Front St. E.	1882-1899
Toronto	Toronto Asphalt Roofing Manuf. Co.	15 Oxford Dr.	1922-1950
Windsor	ACME Roofing Co.	Southeast corner Walker and Edna Sts.	1917-1923
Windsor	Canadian Roofing Manuf. Co. Ltd.	Southeast corner McDougall and Shepherd Sts.	1914-1921

Table 5.1 List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
By-Product Charcoal and Coke Oven Plants of the Iron and Steel Industry			
Hamilton	Dominion Foundries & Steel, Dofasco	North of Burlington E. between Kenilworth N. & Ottawa N.	1951-present
Hamilton	Steel Co. of Canada	Wilcox St.	1918-present
Nanticoke	Steel Co. of Canada	Regional Rd. 3 and Lake Erie	1981-present
Sault Ste. Marie	Algoma Steel Ltd.	South of Baseline & Goetz Rd.	1899-present
Industrial Manufactured Gas Plants			
Cambridge (Preston)	Pattinson Woollen Mill	498 Eagle St. N.	1870s-1890s
Ottawa	Dominion of Canada Fuel Testing Laboratories	552/562 Booth St.	1911-1940s
Niagara Falls	American Cyanamid Co. (Fertilizer Works)	Stone Rd. and Fourth Ave.	1916-1920
North Bay	Pintsch Compressing Co.	535 Stanley St.	1910-1956
Toronto	Pintsch Compressing Co.	Foot of Peter St. east of Spadina	1906-1960
Windsor	Union Natural Gas Co. of Canada	Northeast corner Howard Ave. and E.C. Row North Service Rd.	1929-1950s
Wood Distillation Plants			
Deseronto	E.W. Rathbun, Standard Chemical Co.	Main & First St.	1890-1920s
Donald	Donald Wood Products, Standard Chemical Co.	Part Lot 6 and 7, Concession 1, Township of Dysart, Haliburton County	1908-1945

Table 5.1 List of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Community	Company	Address	Approximate Years of Operation
Wood Distillation Plants			
Fenelon Falls	Standard Chemical Co.	Francis St. and Cameron Lake	1903-1916
Lindsay	Canadian Industrial Alcohol Co. Ltd.	North side Eglington Rd. near Scugog River	1930-1950
Lindsay	Hodgson Bros. Chemical Co. Ltd.	St. Paul and Deniston Sts. near Scugog River	1919-1930s
Longford Mills	Standard Chemical, Iron and Lumber Co., Standard Chemical Co.	Lot 20, Broken Frontage Rama Township	1900-1943
Parry Sound	Standard Chemical Co.	300 m north of Isabella between railway tracks & Georgian Bay	1909-1925
Sault Ste. Marie	Algoma Steel Corp. Standard Chemical Iron & Lumber Co., Standard Chemical Co.	Near St. Mary's River, South of 3rd St.	1911-1928
South River	Standard Chemical, Iron and Lumber Co., Standard Chemical Co.	1 km east of Village on South River	1907-1967
Thornbury	Thornbury Reduction, Standard Chemical Co.	Northeast corner Mill and Bay Sts., at Georgian Bay	1916-1925
Trout Creek	Dominion Wood and Lumber Co.	Concession 1, Parcel 3498, near Hwy 11 east of railway	1920s

5.2 PRELIMINARY ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS OF FORMER INDUSTRIAL SITES

An assessment of the potential environmental impacts of each of the former sites listed in Table 5.1 was completed using the assessment criteria described in Section 2.3.2 and Table 2.1. The results of the preliminary assessment are given in Table 5.2 using high (H), medium (M) and low (L) rankings under each factor. The information necessary to complete the assessment of each site is found on the fact sheets. As was stated in Section 2.3.2, the preliminary assessment is qualitative and reflects the variable, uncertain and conjectural nature of some of the site specific information. The exercise is most useful in identifying categories (site characteristics, evidence of buried wates and resource characteristics) or factors for each site that may indicate a potential environmental impact and to provide a broad overview of each site.

In completing the assessment, the factors concerning visible wastes, odours or water pollution required clarification as to whether the problems were existing or historical occurrences. The distinction is important in terms of the environmental impact because it indicates a present problem or a problem that may have been more significant in the past. Historical occurrences, however, are just as important as present occurrences in terms of potential environmental impacts in that they may indicate the presence of on-site or off-site wastes, past or future impacted areas or migration pathways.

The following section provides a site by site description of each plant and identifies and describes the important assessment factors for each site.

Table 5.2 Assessment of Potential Environmental Impacts of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario

Site Name & Location	Site Characteristics					Evidence of Buried Wastes					Resource Characteristics			
	Size	Location	Current Use/ Ownership	Planned Use/ Ownership	Potential for Excavation	Operating Period	Excavation History	Visible Waste	Odour	Water Pollution	Surface Water Proximity	Surface Water Use	Ground-water Proximity	Ground-water Use
Coal Tar Distillation Plants														
Currie Products Caroline St., Hamilton	H	H	H	L	L	H	H	L	L	L	H	L	L	L
*Currie Products Wentworth St., Hamilton	H	H	L	L	L	H	H	-	-	-	H	L	L	L
*Domtar, Cassidy Works, Hamilton	H	H	L	L	L	H	H	-	-	-	H	L	L	L
Currie Products Lees Ave., Ottawa	H	H	H	L	L	H	H	H	H	H	H	H	H	L
*Domtar Sault Ste. Marie	H	H	L	H	H	H	H	-	-	-	H	L	L	H
*Northern Tar Thunder Bay	H	H	L	L	L	H	H	-	-	-	H	H	H	L
Barrett Lakeshore, Toronto	H	H	H	L	L	H	H	H[b]	H	H[b]	H	H	L	L
Domtar Lakeshore, Toronto	H	H	H	H	H	H	H	H	H	H	H	H	L	L
Imperial Varnish Morse, Toronto	L	H	H	L	L	H	H	L	L	L	H	H	L	L
Paterson/Barrett Hahn Pl., Toronto	L	H	H	L	L	H	H	H[b]	L	L	H	H	L	L
Ford Motor Windsor	H	H	L	L	L	H	H	L	L	L	H	H	L	L
Creosoting Plants														
Calder Creosoting Sioux Lookout	H	L	H	L	L	H	H	H	H	L	H	H	H	H
Canada Creosoting Sudbury	H	H	H	L	L	H	H	H	H	H	H	H	L	L

* - active site
b - evidence from historical reference

Table 5.2 Assessment of Potential Environmental Impacts of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Site Name & Location	Site Characteristics					Evidence of Buried Wastes					Resource Characteristics			
	Size	Location	Current Use/ Ownership	Planned Use/ Ownership	Potential for Excavation	Operating Period	Excavation History	Visible Waste	Odour	Water Pollution	Surface Water Proximity	Surface Water Use	Ground-water Proximity	Ground-water Use
Creosoting Plants (cont'd)														
Canada Creosoting Thunder Bay	H	L	L	L	L	L	H	H	L	L	H	H	L	L
*Domtar Trenton	H	H	L	L	L	H	H	-	-	-	H	H	H	L
Roofing Felt and Tarred Paper Products Manufacturers														
Brantford Roofing Co., Brantford	H	H	L	L	L	H	L	L	H**	L	L	H	L	L
Building Products Hamilton	H	H	L	L	L	H	H	L	L	L	L	L	L	L
Domtar Cornwall	H	H	H	H	H	H	H	H	H	H	L	H	H	H
London Roofing London	L	H	H	L	L	H	H	L	L	L	L	H	L	L
Paterson Manuf. Toronto	L	H	H	L	L	H	H	H[h]	H[h]	H[h]	H	H	L	L
Toronto Asphalt Toronto	L	H	H	L	L	H	H	L	L	L	H	H	L	L
Acme Roofing Windsor	L	H	H	L	L	L	H	L	L	L	H	H	L	L
Canada Roofing Windsor	L	H	H	L	L	H	H	L	L	L	L	H	L	L

** - odour identification complicated by current industrial activity on-site or within area

Table 5.7 Assessment of Potential Environmental Impacts of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Site Name & Location	Site Characteristics					Evidence of Buried Wastes					Resource Characteristics			
	Size	Location	Current Use/ Ownership	Planned Use/ Ownership	Potential for Excavation	Operating Period	Excavation History	Visible Waste	Odour	Water Pollution	Surface Water Proximity	Surface Water Use	Ground-water Proximity	Ground-water Use
By Product Charcoal and Coke Ovens Plants of the Iron and Steel Industry														
*Dofasco Hamilton	H	H	L	L	L	H	H	-	-	-	H	L	L	L
*Stelco Hamilton	H	H	L	L	L	H	H	-	-	-	H	L	L	L
*Stelco Nanticoke	H	L	L	L	L	L	H	-	-	-	H	H	L	L
*Algoma Sault Ste. Marie	H	H	L	L	L	H	H	-	-	-	H	H	H	H
Industrial Manufactured Gas Plants														
Pattinson Woollen Mill, Cambridge	L	H	H	L	L	H	H	L	L	L	H	H	H	L
Fuel Testing Labs Ottawa	L	H	H	L	L	L	H	L	L	L	H	H	L	L
Cynamid Niagara Falls	L	H	L	L	L	H	H	H[b]	H[c]	L	H	H	H	L
Pintsch Comp. North Bay	H	H	L	L	L	H	H	L	L	L	H	H	L	L
Pintsch Comp. Toronto	L	H	H	L	H	H	H	H[b]	H[b]	L	H	H	L	L
Union Natural Gas Windsor	H	H	L	L	L	H	H	L	L	L	H	L	L	L

Table 5.2 Assessment of Potential Environmental Impacts of Industrial Sites Producing and Using Coal Tar and Related Tars in Ontario (cont'd)

Site Name & Location	Site Characteristics					Evidence of Buried Wastes					Resource Characteristics			
	Size	Location	Current Use/ Ownership	Planned Use/ Ownership	Potential for Excavation	Operating Period	Excavation History	Visible Waste	Odour	Water Pollution	Surface Water Proximity	Surface Water Use	Ground-water Proximity	Ground-water Use
Wood Distillation Plants														
Rathbun Co. Deseronto	M	H	H	L	L	H	H	L	H[b]	L	H	M	L	L
Donald Wood Prod. Donald	M	L	M	L	L	H	M	M	M	H	H	H	M	L
Standard Chemical Fenelon Falls	M	H	H	L	L	M	M	L	I	L	H	H	L	L
Can. Ind. Alcohol Lindsay	H	L	H	H	H	M	H	L	H	L	M	M	L	L
Hodgson Bros. Lindsay	M	H	H	L	L	M	M	L	L	L	H	M	L	L
Standard Chemical Longford Mills	M	L	L	L	L	H	M	L	M	L	M	H	M	M
Standard Chemical Parry Sound	M	H	H	L	L	M	M	L	L	L	M	M	L	L
Standard Chemical Sault Ste. Marie	M	M	L	L	L	H	M	L	H[a]	L	H	M	M	M
Standard Chemical South River	M	H	H	H	H	H	M	M	M	L	H	M	M	H
Standard Chemical Thorobury	M	H	H	H	H	L	H	L	L	L	H	M	L	L
Dominion Wood and Lumber Trout Creek	L	L	H	L	L	L	L	L	L	L	H	M	M	M

5.3 DESCRIPTIONS OF INDUSTRIAL SITES PRODUCING AND USING COAL TAR AND RELATED TARS IN ONTARIO

This section contains site descriptions for each site and an assessment of potential environmental impact for each former site. The sites are listed alphabetically by location and by industrial activity. The site descriptions should be read in conjunction with the detailed site information contained in the appendices.

5.3.1 Coal Tar Distillation Plants

5.3.1.1 Hamilton - Currie Products Ltd., Caroline St.

Site Description

This site was one of the first coal tar distillation plants in Ontario and operated under several owners from about 1901 to 1977. Currie Products operated the site from 1929 to closure in 1977. The site was located on the east side of Caroline St. between Mulberry and Sheaffe Sts. and originally processed coal tar from the Hamilton city gas works located at Mulberry and Bay Sts. In later years this site processed coke oven tars from the Hamilton By-Product Coke Ovens and Stelco. Products manufactured in 1919 included creosote oils, pitch, naptha, naphthalene, tarred paper and roofing felt. Products listed in 1967 included creosote, disinfectants, oils, paints, pitch, road tar, refined tar and wood preservatives.

This site was sold to the City of Hamilton in the late 1970s and the city demolished the site in 1979/80. The contract for site demolition required that all tar tank contents be disposed in accordance with MOE regulations. Approximately 150,000 gallons of liquid and semi-liquid tar waste were estimated to have been removed from the site as part of the demolition.

Today this site is a City of Hamilton park with tennis courts, baseball diamond and children's playground. The park was constructed by eliminating Caroline St. between Sheaffe, Mulberry and Cannon St. W. The site is surrounded by a warehouse to the north, city works yard to the east and residences and parkland to the south and west.

Potential Environmental Impact

This site operated for a long period of time (76 years) and also early when tar handling and disposal practices were more likely to have resulted in buried tar wastes. However, as part of the City of Hamilton demolition of the plant, all soils in areas of buildings and storage tanks (surface and underground) were to have been removed to a depth of 0.6 m below grade. Details of the actual demolition and soils excavation at this site were not available. No visible wastes were observed at the site during the site visit. Odour detection at the site was not possible because of the odours associated with operating steel works in the area.

Because of the lack of evidence of buried waste, continued land use, absence of groundwater use and distance to surface water, potential environmental impacts and health effects at this site are considered minimal. However based on the period of operation and subsurface conditions from similar sites, contaminated groundwater and soil likely exist at this site. Migration of contaminated groundwater is also likely along the bedding material of buried utility lines and sewers that transect the park along the former alignment of Caroline St. However because of the lack of groundwater use and distance to surface water there is no quantifiable impact from this likely contamination.

5.3.1.2 Hamilton - Currie Products Ltd., Wentworth St.

Site Description

Currie Products Ltd. relocated from the Caroline St. site to a site at 350 Wentworth St. in about 1978. The site is located at Rosemary Avenue and Wentworth Street North and is occupied by Currie Products Ltd. and Marshall Currie Refractories. Tar tank storage and distilling/processing facilities are located at the rear of the existing building. The rear of the site is fenced with controlled access. The site is located in a mixed residential/commercial/ industrial area with a car dealer located to the north, vacant land to the east and south and residences and a bar-restaurant to the west. The back of the property is reclaimed land from the Coal Oil inlet of Hamilton Harbour. There is no groundwater use in the area and the closest surface water is Hamilton Harbour at 800 m north east of the site. This is an active tar distillation/processing plant and was therefore not subject to assessment of potential environmental impact.

5.3.1.3 Hamilton - Domtar Cassidy Works

Site Description

Dominion Tar and Chemical Co. Ltd./Domtar Inc. operated a coal tar distillation plant at 725 Strathearne Avenue North from sometime in the late 1950s to present. This 3 hectare area site is still active and in 1967 produced creosote oils, roofing and other pitch and refined coal tar products. The site is now operated by Carbochem, a Domtar Rutgers Co. and processes coke oven tar from Stelco and Dofasco.

The site is located in a heavy industrial area with Dofasco, metal scrap yards, and the Canada-West Indies Molasses Co. occupying surrounding lands. A dock inlet of Hamilton Harbour is located 100 m to the northeast of the site. A ditch drains from the southwest corner of the site, into the site and likely to Hamilton Harbour.

This site is the subject of an ongoing hydrogeological study conducted by the property owner. As an active site it has not been subject to assessment of potential environmental impact.

5.3.1.4 Ottawa - Currie Products

Site Description

A coal tar distillation plant was located at 170 Lees Avenue in Ottawa from about 1922 to about 1949. The property was operated by Currie Products Ltd. who also used the property for tar storage until about 1970. The company produced creosote oils, pitch, road tar, tarred felts and sheeting, tar paints and cements and other products. The plant received its raw materials (i.e., tar) from the Ottawa Gas Company's coal gasification plant until 1939 and later from Stelco, Hamilton. The plant covered about 1.7 hectares of area between Lees Avenue and the Rideau River to the south.

The property today is occupied by a high-rise apartment building with underground parking. Other apartment buildings are also found to the north and east while an armory is located to the west.

Potential Environmental Impact

Coal tar wastes have been identified in the subsurface in the area of the former plant and a hydrogeologic study has been completed for MOE as part of investigations of the Ottawa Lees Avenue coal tar problems. Coal tar was identified in soils and groundwater in the area to the west of and under the apartment building. Tar was also found to be seeping into the lowest floor of the underground parking garage, resulting in odours in the garage. The coal tar in the soil has also caused shallow groundwater contamination which is migrating easterly towards an adjacent apartment building. Coal tar was also found adjacent to a storm sewer line that discharges to the river at the western boundary of the property.

The potential environmental impacts of this site result from free coal tar in the soil and groundwater contamination. The coal tar seeping into the building results in odour problems in the garage and increases the possibility of direct contact with the tar. These impacts have been reduced by closing off and limiting access to the lowest level of the garage. It is also possible that the free coal tar may be migrating to the river via the bedding material of the storm sewer but there is presently insufficient evidence to support this hypothesis.

In terms of groundwater contamination, the groundwater flow direction is to the east to the drainage system and sump of the adjacent apartment building which is the low point in the area and below Rideau River level. If contaminated groundwater reaches the sump it will be discharged to the storm sewer which will in turn discharge the contaminated water to the Rideau River. Although the impact on the river may not be measurable, it may increase the loading of PAH to the river.

5.3.1.5 Sault Ste. Marie - Domtar Inc.

Site Description

The Domtar Chemicals Group formerly Dominion Tar and Chemicals Ltd. has operated a coal tar distillation plant in Sault Ste. Marie since about 1911. The plant distills tar produced by the Algoma Steel Co. to make a wide range of chemicals ranging from naphthalene to creosote and pitch. Domtar's facilities are located at 55 Baseline Road adjacent to Algoma Steel's plant site and slag dump. The Domtar site is separated from the Algoma plant site by the Algoma slip on the St. Mary's River and Bennett Creek and is drained by Spring Creek which is found to the south of the plant site. The 9 hectare site is scheduled to close on July 1, 1988. The area surrounding the Domtar site is primarily industrial land belonging to Algoma Steel.

The Domtar site is currently the subject of an ongoing hydrogeologic study being conducted by Domtar. As an active site, this site was not assessed for potential environmental impact.

5.3.1.6 Thunder Bay - Northern Wood Preservers Inc.

Site Description

In Thunder Bay, a creosoting plant and a coal tar distillation plant were operated by Northern Wood Preservers Inc. (Northern Tar and Chemical Co. Ltd., Northern Wood Preservers Ltd., Northern Forest Products Ltd.). The coal tar distillation plant was in operation from 1946 to the late 1970s while the creosoting plant began in 1940 and is still in operation today. The plants were located at the north end of Maureen Street adjacent to Lake Superior on reclaimed land. The entire site including wood and tie storage areas occupies about 20 hectares.

The wood preservation operation uses creosote, pentachlorophenol and chromated copper arsenate for the preservation of wood against decay. The Northern Wood Preservers plant preserves lumber for decks and wharfs, railway ties and telephone poles using an oil-borne pressure treating retort.

The area around the plant site has mostly industrial land uses. The wood preservation plant is located on the shore of Lake Superior.

Poential Environmental Impact

The Northern Wood Preservers site is an active site and is presently under investigation by the Ministry of the Environment. A control order has been imposed against the company as a result of contaminant discharges to Lake Superior.

5.3.1.7 Toronto - Barrett Co.

Site Description

The Barrett Co. operated a coal tar distillation and roofing felt plant at the southeast corner of Saulter St. and Lakeshore Blvd. E. from 1921 to 1965. The plant likely operated in association with the Consumers Gas Station "B" gas works and had a street address of 675 Lakeshore Blvd. E. Tar storage, distillation and felt saturation were undertaken at the northern and central parts of the property, warehousing and storage operations were located at the southern end of the property.

Today the Barrett Co. site is occupied by a Greyhound bus garage and parking lot on the north and central sections of the property and a poultry processor on the southern end of the property. The bus garage and parking lot were constructed in 1981/82. The site is located in an industrial-commercial area with vacant land to the west, a wreckers to the south and fuel storage and used car lot to the east. Access to the site is largely unrestricted although the Greyhound property is fenced.

Potential Environmental Impacts

Creosote and tar were encountered at this site during redevelopment of part of the site for the Greyhound bus garage in 1981/82. Large quantities of oily contaminated fill were removed from the site and disposed at the Beare Rd. landfill. Crushed stone and fill were added to the site to stabilize the oily ground for construction activities. Ontario Ministry of the Environment observation/inspection reports document occurrences of visible creosote wastes and odour complaints at the site during construction. Creosote was observed seeping into the excavation for the underground diesel

fuel tanks and some areas of visible creosote contamination were left on-site and covered. A minor odour of tar detected in a Greyhound parking lot catch basin in conjunction with the above reports indicates tar wastes are buried on-site.

Although contaminated groundwater and soil likely exist at this site, the environmental impacts associated with this waste are not considered significant. With the exception of the diesel fuel tanks all construction at the site is on or above grade and no groundwater collection or drainage systems are in place. Also, there is no groundwater use in the area and the nearest surface water body is Lake Ontario at 250 m to the south. Although some drainage of contaminated groundwater and creosote is likely to utility line bedding materials located near Lakeshore Blvd. E. no tar odours were apparent from the storm and sanitary sewer manholes on Lakeshore Blvd. E.

5.3.1.8 Toronto - Dominion Tar and Chemical/Domtar

Site Description

In Toronto, the Dominion Tar and Chemical Co./Domtar Inc. operated a coal tar distillation/processing plant from about 1925 to 1973. The plant was located on the east side of Logan Ave. between Lakeshore Blvd. E. (earlier Keating) and Commissioners Rd., had a street address of 801 Lakeshore Blvd. E. and operated in association with the Consumers Gas Station "B" site. The plant produced creosote, pitches and roofing materials from 1925 - 1935. In 1935, a phenol, cresol and xylenol extraction facility was built at the south end of the property. In 1941, in response to war time demand, a phthalic anhydride manufacturing facility was constructed, also at the south end of the property near Commissioners Rd. Tar stills ceased operation at the site in 1959.

The site is now occupied by a recently constructed (1987 - 88) tennis and racquet club on the north and central parts of the property. Expansion of the racquet club to the south and central parts of the property was underway in April, 1988. The most southern part of the property is used as an unpaved parking lot and redevelopment of this property for industrial use is likely. The site is located in a mixed, public use, commercial and industrial area, with parkland and City of Toronto incinerator located to the west, and lumber yards and petroleum storage areas to the east. Access to the site is fenced although unrestricted.

Potential Environmental Impacts

Environmental concerns at this site are documented in the files of the Toronto Office of the Ontario Ministry of the Environment and a 1985 consultant's report (Cutforth, White and Associates, 1985) describing a proposed rehabilitation and redevelopment plan for the property. A hydrogeologic study completed as part of the consultant's

report identified groundwater and soil contaminated by phenols, light aromatics and polynuclear aromatic hydrocarbons (PAH). This study also shows that groundwater flow prior to site redevelopment was off-site to the north, east, west and southeast. Potential environmental impacts associated with this groundwater flow are lessened by the complete lack of groundwater use in the area of the site.

Today, groundwater flow at the site is likely directed toward the racquet club building as a result of subsurface construction and the installation of a tile drain system to collect groundwater. Collected groundwater is treated at the site using carbon filter units and discharged to the sanitary sewer in accordance with the Ontario Ministry of the Environment and the City of Toronto. Because of these mitigative measures potential environmental impacts associated with the north and central parts of the property are considered minimal.

The southern part of property adjacent to Commissioners Rd. contains some underground tanks and a concrete cistern filled with water and residual creosote or tar. This property is likely to be developed for industrial use and potential environmental impacts in the form of contaminated water and tar dispersal and air quality degradation may result if proper precautions are not exercised during redevelopment.

5.3.1.9 Toronto - Imperial Varnish and Colour

Site Description

Imperial Varnish and Colour (Imperial Paint and Varnish) operated a paint and varnish works on the north side of Lakeshore Blvd. E. between Logan and Carlaw Streets from 1900 to 1960. In the period 1916 - 1929 Imperial Varnish and Colour processed approximately 900,000 gallons per year of water gas tar from the Consumers Gas Station "B" works. This water gas tar was presumably used as a base for paints and varnishes. The original plant works were located between Logan and Morse Streets and fire insurance plans for the 1935 period show pitch tanks and boiler houses. It is likely that this site stopped using tar as a raw material sometime between 1935 and 1951. In this period, the plant expanded to occupy the north side of Lakeshore Blvd. E. between Morse and Carlaw. The original Logan - Morse St. site was occupied before 1900 by the J.H. Farr Varnish Works.

The entire site is now occupied by Purolator Courier Ltd., who use the two block site as a processing station and parking yard for their trucks. The site is located in a commercial area. A large warehouse occupies the majority of the earlier site between Logan and Carlaw Sts. and a warehouse/office building occupies the former site betwween Morse and Carlaw Sts. All buildings are on grade constructions with no basements or groundwater collection systems.

Potential Environmental Impact

Although large volumes of water gas tar were processed at this site, today there is no evidence of buried wastes at the site. The existing buildings were inspected and no visible wastes or odours were detected. The existing buildings were constructed in the mid

1960s. Details of the demolition of the Imperial Varnish and Colour buildings and of the excavation and construction of the existing buildings are however not available.

Based on the site visit and the available information, potential environmental impacts at this site are considered minimal. Potential environmental impacts at this site are also mitigated by the distance to surface water and the lack of groundwater use in the area of the site.

5.3.1.10 Toronto - Paterson Co./Barrett Co.

Site Description

A coal tar distillation plant and roofing felt manufacturing plant was located at the bottom of Berkeley St. adjacent to Lake Ontario from about 1900 to 1921. The site was originally operated by Paterson Manufacturing Co. Ltd. for the manufacture of roofing paper and felt and later by the Barrett Co. as a distiller of coal tar and a producer of creosote, light oils, heavy tar oils, tarred felts, roofing paints, tarvia, pitch and prepared roofings. The Barrett Co. relocated from this site to the site on Lakeshore Blvd. E. circa 1921.

Today, the site is occupied by an apartment building complex with a street address of 5-33 Hahn Place. Underground parking garages are associated with the complex. The site is no longer on the water front as a result of landfilling of Lake Ontario and is located in a residental/public use area.

Potential Environment Impact

During excavation in 1980/81 for the construction of the Place St. Laurent apartment building, oily and tar contaminated soils were encountered. During caisson installation, liquid "oily" contamination was reported (Linneman, 1988) seeping into the caisson excavations. Contaminated fill and soil was removed from the site and trucked to an unknown disposal location. Most of the contaminated soil was removed from the north end of the property close to Berkeley St. A vapour/gas venting system was also installed below the building located at 5-31 Hahn Place.

Although historical evidence indicates that coal tar wastes are likely present in the subsurface soils and that contaminated groundwater likely exists on-site, the potential environmental impacts

at this site are not considered severe. The underground parking garages were inspected and no visible or olfactory evidence of wastes was apparent. Although there have been periodic complaints by tenants of the gas venting from the building at 5-31 Hahn Place it is not clear that these odours are derived from coal tar wastes as opposed to landfill materials used to reclaim the land in the late 1800s and early 1900s. Groundwater flow at the site is now directed to the apartment building sumps and some contaminated water may discharge to the storm sewers. This potential impact was not confirmed, as the storm sump was not inspected during the site visit because the sump covers were rusted shut.

5.3.1.11 Windsor - Ford Motor Co.

Site Description

The Ford Motor Company operated a low temperature coal tar distillation plant as part of their Walkerville operations from 1923 to sometime in the late 1950s. The two hectare site was bounded by Riverside Drive, Belleview, Cadillac and Wyandotte Streets and included a coke oven, bunker house, gas scrubbers, 500,000 cubic foot gasometer and by-products building. The gas produced at the plant was used in forging and heat treating operations, the ammonia sulphate was used as fertilizer, creosote was sold for wood preservation and benzol while the heavy tar fractions were used as gasoline and fuel oil substitutes. The Ford plant differed from previous coke oven practices in that the coal was distilled at a comparitively low temperature which made possible the recovery of a greater percentage of volatiles.

Today the site is owned by Ford and is used as the Ford Motor Co. power plant. The site is fenced with controlled access and is located within a residential and commercial area. The Detroit River is located about 50 m north of the site and 100 m north of the power plant building. The original 1923 power plant building and by-products building are both still standing. Foundations of the coke oven and part of the bunker house and underground concrete tanks are also evident on-site. Bulk fuel storage tanks are now located to the west of the former by-products building. The area of the former gasometer is now the front lawn of the Ford power plant.

Potential Enviornmental Impact

No evidence of buried tar waste was observed or reported for this site. The potential human health and environmental impacts for this site are considered low because of this lack of evidence of buried waste, lack of groundwater use in the area, controlled site access, and

continued industrial operation. However little information is available describing the subsurface conditions of the site from either recent excavations or redevelopment. Based on excavation history at other tar distillation facilities some tar contaminated soil and groundwater is likely to exist at this site and therefore migration of contaminated groundwater to the Detroit River may be a concern.

5.3.2 Creosoting Plants

5.3.2.1 Sioux Lookout - Calder Creosoting Co.

Site Description

Calder Creosoting Co. (and possibly Canada Creosoting Co.) operated a creosoting plant 1.6 km east of Sioux Lookout from about 1928 to 1960. The site, including railway tie storage area, was about 20 hectares; the creosoting plant area was about 0.5 hectares. The plant consisted of two 10 m high creosote storage tanks, retort, pump house, loading platform and steel cylinders for creosote application.

Today the site is vacant land located south of the Sioux Lookout - Superior Junction Rd. The area is reported to be marshy with fill and sand and clay overlying bedrock. Surface drainage is from north to south across the site through swales and ditches and eventually to Pelican/Abram Lake. An unnamed stream located 200 m south of site collects site runoff and drains to these lakes. There is likely groundwater use 800 m north of the site associated with one of the residences located north of the railway line. Other residences in the area transport water from the town (lake) supply. This site was not visited by INTERA staff, but was visited by local Ministry of the Environment officials.

Potential Environmental Impact

Conditions and evidence of waste at this site are reported by Ontario Ministry of the Environment staff from a site visit made in May 1988. During the site visit, hardened tar or creosote pitch was observed on surface in several locations across the site and local odours of creosote were evident on site. Given the evidence of creosote waste on site the potential environmental and human health impacts at this site are determined by the potential impact on surface

water bodies in the area and the impact on shallow groundwater. Surface water drainage from the site is to a swamp which eventually drains to the unnamed stream. The one potential user of the groundwater is located at a sufficient distance from the site that it is unlikely the well would be affected by the site. With these use restrictions, the impact of the creosote is likely limited to minor surface water impacts and odour on-site.

5.3.2.2 Sudbury - Canada Creosoting Co. Ltd.

Site Description

In Sudbury, a creosoting plant was located on the south side of Lorne Street between Sutherland and Bulmer Streets. The plant was operated by the Canada Creosoting Co. Ltd. from 1925 to 1942 and Dominion Tar and Chemical Co. Ltd. from 1942 to 1963. The creosoting plant was used to creosote railway ties, paving blocks, and telephone poles. The original property covered 20 hectares.

At present, the site has been developed into a number of commercial buildings including warehouses, bottling plant, office malls, bakery and fitness centre. The commercial buildings extend from Lorne Avenue south to the CP railway tracks. Junction Creek found to the south of the railway tracks, receives most of the site drainage via a series of ditches and swales.

Potential Environmental Impact

Waste materials from the creosoting plant have been identified on-site. Creosote was exposed at surface in a ditch in the area of Webbwood Drive. In the excavation of the Loeb Warehouse at 1010 Lorne Street in 1987, creosote material was found in the soil. Analysis of the soil using the MOE leachate extraction test indicated that the soil was contaminated by benzo(a)pyrene.

Based on the evidence of creosote wastes on the former plant site, it is possible that environmental impacts are occurring. The most likely cause of the impact is leachate migration to Junction Creek. The contaminated soil is relatively shallow and any leachate generated from the soil will likely discharge to the drainage ditches.

The ditches in turn discharge to Junction Creek. At least five ditches drain from the creosote plant area to the Creek.

The fact that creosote was exposed at surface may also present a potential impact in that there can be direct human contact with the waste. Creosote is considered a hazardous waste chemical and exposure to the waste should be limited.

5.3.2.3 Thunder Bay - Canada Creosoting Co. Ltd.

Site Description

A creosoting plant was operated in Thunder Bay by the Canada Creosoting Co. Ltd. from 1940 to 1942 and by Dominion Tar and Chemical from 1942 - 1946. The plant was located on McKellar Island adjacent to the Kaministikwia River, north of Carpenter St. east of 105th Avenue. The entire property occupied about 10 hectares, but the creosoting plant covered 1 - 2 hectares with the rest of the property used for timber storage. Layout of the former plant site is not well documented due to poor historical map and air photo coverage.

Today the property is a petroleum bulk storage area with controlled access. Most of the surrounding land is vacant. Land to the east is also used for petroleum bulk storage and the Kaministikwia River is adjacent to the north of the former plant site.

Potential Environment Impacts

Although the creosoting plant was only is operation for about 6 years, waste material remains on-site. The waste consists of creosote tar found at surface surrounding a large diameter water pond. There are no odours associated with the exposed wastes. The plant building foundations and an old steel tank also remain at the site.

Potential environmental impacts are likely to result from surface water runoff and groundwater discharge to the Kaministikwia River and possibly separate phase tar migration to the Kaministikwia River if such tar is present in the subsurface. With waste exposed at surface on the edge of a pond, it is possible that the pond has received leachate from the waste. Similarly contaminated groundwater likely discharges to the pond and water from the pond probably

discharges to the river. The overall impact on the river water quality from aqueous phase contaminants is likely to be small considering the dilution effect of the river but sediments in the river or sediments from surface water runoff may be contaminated with material derived from the creosote.

5.3.2.4 Trenton - Canada Creosoting Co./Domtar

Site Description

In Trenton, a creosoting plant has been in operation from about 1913 until the present at 126 Marmora Street. The property is bounded by Marmora Street, CN tracks to the south, CP tracks to the north and the Trent River on the west. The creosoting plant was operated by the Canada Creosoting Co. Ltd. from 1913 until 1942 when it was sold to Dominion Tar and Chemical/Domtar Inc. who have operated the plant from this date. The plant presently processes railroad ties, bridge timber, and pilings and some lumber for wood preserving utilizing a creosote/oil process or an oil/pentachlorophenol process. The entire site including wood storage areas covers 18 hectares.

The creosoting plant is still active today. The property is surrounded by residences to the east, industry to the north, a police station to the south and the Trent River on the west.

Potential Environmental Impacts

The creosoting plant is an active site and therefore was not subjected to an environmental impact assessment. The site is presently under an MOE control order and the property owner is conducting investigations of the property.

5.3.3 Roofing Felt and Tarred Paper Product Manufacturers

5.3.3.1 Brantford - Brantford Roofing Co.

Site Description

The Brantford Roofing Co. was one of the first roofing felt manufacturers in Canada and operated at 22 Sydenham St. from 1906 to 1954. The plant was later operated by Murray Brantford Ltd. and Domtar Construction Materials. Today, Domtar manufactures asphalt roofing shingles at this plant. Fire insurance plans from 1912 show several tar melting tanks and underground concrete tanks that were likely used for fuel and/or tar storage. Products manufactured in 1949 - 1954 included tar and asphalt saturated rag, asbestos felts and coated sheathings. It is unlikely that coal tar was used at this site after about 1954.

Today, the site is located adjacent to the CN rail line and is in a residential - commercial area with residential land use opposite the plant on the west side of Pearl Street. The original buildings shown on the 1912 fire insurance plan are evident and by 1950 the site expanded to occupy the bounding streets of Sydenham, Pearl and a laneway south of Niagara.

Potential Environmental Imapct

Potential environmental impact associated with the earlier operations of the Brantford Roofing Co. are considered minimal at this site because of the lack of evidence of buried wastes, the lack of below grade construction, the distance to surface water and the apparent lack of groundwater use in the area. In the past 10 years, upgrading of the plant has resulted in excavation in several areas of the plant and these excavations have reportedly not encountered tar wastes. This excavation did however encounter a buried empty concrete tank. Odour identification at this site is complicated by the asphaltic odour emitted from the active roofing plant.

5.3.3.2 Hamilton - Building Products Ltd.

Site Description

Building Products Ltd. operated a roofing felt and tarred paper products manufacturing plant from about 1910 to about 1970. Coal tar use at this site was likely restricted to operations up to the mid 1950s. In this period reported products were prepared roofing, tar and asphalt saturated rag and asbestos felts and tar and asphalt saturated and coated sheathing. Plant layout is not well defined for this site as a result of poor historical map and air photo coverage.

Today the site is a controlled access (fenced) storage yard of the Stelco Frost Works. Storage and warehousing of vinyl chain link fence and welded fabrics is now carried out in the area of the former storage tanks and manufacturing building. The site is located in a combined heavy industrial, commercial and residential area, with commercial and residential land use on the north side of Beach Rd. and industrial use to the east, west and south of the site.

Potential Environmental Impact

This site has a low potential environmental impact primarily as a result of a lack of evidence of buried waste and the current controlled access, industrial land use. The site was visited and no evidence of visible waste odour or water pollution was apparent. Most of the former site is now a paved storage yard. Excavation in 1969 for installation of new storm sewers also did not report buried waste at the site. The potential environmental impact at this site is also mitigated by the lack of groundwater use in the area and the distance to surface water.

5.3.3.3 Cornwall - Domtar Ltd.

Site Description

In Cornwall, Domtar Construction Material Ltd. used a tar impregnated cardboard material to make a waterproof pipe. This operation began in about 1947 and continued until about 1969. The plant was located on Seventh Avenue in the block bounded by Seventh, Cumberland, C.N. Railway and Highway 2. When in operation the property was about 3.2 hectares in area.

The site is presently used for industrial purposes including manufacturing and waste disposal companies. One of the on-site buildings is vacant and the building and adjacent property is for sale. The property is fenced but access is unlimited. The City of Cornwall is planning to extend Eleventh Avenue across the north boundary of the site on the north side of the railway tracks. Land use in the surrounding area consists of residential land use to the north and east and commercial use to the west and south. The property is drained to storm sewers by drainage ditches in the northwest and northeast corners.

Potential Environmental Impact

At this site, waste tar and off-grade and broken pipe were disposed on-site. Tar in piles is exposed in the northwest corner of the site while waste pipe covers the ground in the northeast corner. The waste is exposed at surface and susceptible to direct contact. There is evidence of bicycle paths through the waste piles indicating that the area is a play area for children. A creosote odour is also found in the area of the tar piles. In 1986, the Ministry of the Environment sampled surface runoff from the site and the waste piles and found evidence of coal tar components. In the spring of 1987

Domtar sampled the surface water in the area of the site including the drainage ditches. The results indicated that PAH at trace levels are found in the sediments and surface water.

The potential environmental impact exists primarily from direct contact with the exposed wastes. The waste material contains hazardous materials and dermal contact or inhalation of dust or vapours could represent a health risk.

Surface runoff and groundwater are probably affected by the waste but the impact is likely negligible. Surface water drains to a storm sewer and the Domtar sampling indicates that, at the inlet to the storm sewer, the PAH concentrations are non-detectable. There are no users of the shallow groundwater, although the deeper groundwater in the bedrock, which is confined by overlying clay and till, has industrial users in the area.

5.3.3.4 London - London Roofings Ltd.

Site Description

In London, a tar paper and roofing felt industry was located at 1350 Trafalgar Road on property bounded by Trafalgar, Highbury Road and the CN railway. The industry was in operation from about 1939 and continued into the 1970s but it is likely that the use of coal tar ended by the mid to late 1950s. The roofing tar plant was run by a number of companies including Canadian Roofing Ltd. (1939 - 1940), London Roofings Ltd. (1940 - 1943), Viceroy Manufacturing Co. (1943 - 1948), Bishop Asphalt Papers (1948 - 1958), and Northern Roofing Co. (1958 - 1970s). The operation was relatively small occupying about 0.5 hectares.

Today the property has mostly commercial use with occupants including a roofing contractor, a garage and a warehouse. Some of the original buildings are still in use. Adjacent land uses are primarily commercial and residential.

Potential Environmental Impact

There have been no reported problems associated with this site. Waste materials, odours or water pollution were not observed at the site during the site visit. However, a small disposal area was identified on the site and operational from about 1942 to the 1960s. Some waste tar or roofing materials may have been disposed in this dump which was located adjacent to the CN tracks. This former disposal area is now part of an unpaved parking lot.

Given the lack of visible and olfactory evidence of waste, the present commercial land use and no surface water or groundwater use in the area, it is unlikely that this site poses a potential environmental or human health hazard.

5.3.3.5 Toronto - Paterson Manufacturing Co.

Site Description

From 1884 to 1898, Paterson Manufacturing Co. operated a roofing felt works at 297 - 307 Front St. E. in Toronto. The plant manufactured dry and tarred felt, pitch, roof paint, chemicals and rosin. The plant was operated in association with the Consumers Gas Station "A" gas works and was located adjacent to the Station "A" tar wells. Expansion of the Station "A" plant in about 1900 occupied the site with gas holders and Patersons moved to the Berkeley St. site (now 5 - 33 Hahn Place). The site is now fully occupied by the Administration/Service Centre of the Toronto Public Library. The site is located in a commercial area and site access is restricted.

Potential Environmental Impact

Because this site was later occupied by the Station "A" gas works, the site has been previously described and assessed in the INTERA (1987) report on former coal gasification plant sites. Relevant information on this site is taken from the earlier report.

Excavations in 1986 for the construction of the Toronto Library building and subsequent site investigations in 1986 and 1987 confirmed the presence of buried coal tar wastes at this site. Although coal tar wastes are likely still on-site, the potential environmental impact at this site is considered minimal because of the lack of groundwater use, low potential for future excavation and distance to surface water.

5.3.3.6 Toronto - Toronto Asphalt Roofing Manufacturing Co.

Site Description

A roofing felt manufacturing plant operated at 15 Oxford Dr. from 1922 to about 1978. The plant was initially operated by Toronto Asphalt Roofing Manufacturing Co. to 1948 and later by the Canadian Gypsum Co. Ltd. Early fire insurance plans show that this site had a manufacturing plant and warehouse. Products identified in 1949 - 1954 included tar and asphalt saturated and coated sheathings. It is estimated that coal tar and coal tar pitch were not processesd on this site after the early 1950s although coal tar was reportedly stored on-site in 1964. The site ceased operation 1978.

In 1980/81, a high rise apartment building was constructed on the site. The site is now situated in a residential area and backs onto the CN rail line.

Potential Environmental Impact

This site was inspected and no evidence of buried wastes were detected. The apartment building has underground parking garages and both parking garage catchbasins and the building storm water sump were inspected and found to be clean and free of tar wastes. Also, no subsurface wastes were reported during excavation and construction of the apartment building.

Based on the observed conditions and reported information, this former roofing felt manufacturing site is not considered to pose any significant environmental or human health impact.

5.3.3.7 Windsor - Acme Roofing Co.

Site Description

A roofing felt and tarred paper products plant was located in Windsor from 1917 to 1923. The Acme Roofing Company which produced prepared roofing and pitched and tarred asphalt was located at 124 Walker Road (now 866 Walker Road) on the southeast corner of Walker and Edna Street. The plant was a small operation occupying 0.5 hectares.

Today, the property has primarily commercial uses, with occupants including printing, electrical and glass companies. The original building remains on the property. There is no surface water in the area.

Potential Environmental Impact

On this site, there has been no reports of waste materials and nor are there visible wastes or odours; however, there has been no excavations on the property. The environmental problems associated with the operation of the tarred paper plant are expected to be negligible, based on the short operation period, the commercial land use, and the lack of evidence of buried wastes.

5.3.3.8 Windsor - Canadian Roofing Manufacturing Co. Ltd.

Site Description

On the southwest corner at McDougall and Sheppard Streets, the Canadian Roofing Manufacturing Co. Ltd. operated a tar paper and roofing felt plant. The plant produced prepared roofing, tarred felt, asphalt paint, and asphalt cement. From 1914 to 1924, the plant was in operation. In 1924 the manufacturing plant was closed, the business was combined with the Brantford Roofing Co. Ltd. and the Windsor property was used only as a warehouse. The former plant property covered about 0.9 hectares.

Today some of the original buildings are still in use and the concrete pad used for the tar storage tanks is still evident. The property is occupied by a cable T.V. company and an auto body shop. Part of the property is fenced with controlled access.

Potential Environmental Impact

The property has had no reports of buried wastes on-site and the site investigation did not identify problems on the site. Given the commercial land use, the lack of evidence of buried wastes and the short operating period, it is unlikely that this property has any significant potential environmental impacts associated with the former roofing manufacturer.

5.3.4 By-Product Charcoal and Coke Oven Plants of the Iron and Steel Industry

5.3.4.1 Hamilton - Dofasco Inc.

Site Description

Dofasco Inc. has operated a coke oven product plant north of Burlington St. between Ottawa North and Kenilworth North since 1951. Dofasco currently operates three by-product coke plants on this property. Coal tar generated by these coke plants has always been sold for distillation and reprocessing. Tar generated by Dofasco was sold to Domtar (Toronto plant until 1960 and Hamilton plant from 1958 to the present) and to U.S. companies. Tar decanter sludge was previously mixed with slag and other residuals to reclaim various areas of Dofasco bay front property and to act as interim cover at regional landfill sites. Since 1980 decanter sludge has been blended with coal mix and charged back to the coke ovens.

The Dofasco site is located on Hamilton Harbour in a heavy industrial area. On-site inspections were not performed and as an active site, this site was not assessed for potential environmental impact.

5.3.4.2 Hamilton - Stelco Inc., Hilton Works

Site Description

The Steel Company of Canada Ltd. (Stelco Inc.) has operated coke ovens and by-product plants at their Hamilton Hilton Works site since 1918. The coke ovens and by-product plants are located on the western part of the steel mill complex adjacent to the Hamilton Harbour at the northern end of Wilcox St.

Two by-product plants are presently in operation: one since 1918 and enlarged in 1947 and one since 1972. Four coke oven batteries are presently in operation, two batteries were dismantled in 1951 and 1953 respectively and one battery has been idle hot since 1981. According to Stelco, tar from the two by-product plants is usually sold for outside processing however some of the tar is recycled to the blast furnaces in place of coke. Tar sludge from tar decanters is currently, in part, processed through blenders and sold or burned with the tar. Excess material and tank cleanouts are sent to an approved landfill for disposal.

The Hilton Works is an active site and has not been assessed for potential environmental impact.

5.3.4.3 Nanticoke - Stelco Inc.

Site Description

The Lake Erie Works of Stelco Inc., located in Nanticoke, includes a coke oven and by-products plant. The plant is located on Regional Road No. 3 at Lake Erie and has been in operation since 1981. The coke oven battery includes 45 ovens and one by-product plant covering an area of about 10 hectares. The tar from the by-product plant is sold for outside processing into saleable products such as creosote, roofing materials, etc. Tar sludge is presently disposed to an approved landfill but a method to recycle the sludge is under development.

The steel works has controlled access and is surrounded by rural/residential land use. Lake Erie is adjacent to the site to the south.

As an active site, an environmental impact assessment was not completed for this property.

5.3.4.4 Sault Ste. Marie - Algoma Steel Corporation

Site Description

The Algoma Steel Company Ltd. operated a coke oven by-product plant in association with their steel mill in Sault Ste. Marie from 1911 to the present. The coke ovens and the by-product plant are located off of Baseline Road (formerly Wilde Avenue) adjacent to and on the east side of the Algoma slip. The by-products plant produced coal tar, sulphuric acid, benzol, toluol, naphthalene and other related products during its history. Some of the coal tar was used by Domtar, located west of the Algoma slip, in their tar distillation plant. Also located west of the Algoma slip is the slag dump which was built on reclaimed land out into the St. Mary's River. Various areas within the slag dump are used for disposal of various types of plant wastes.

The area to the north of the coke ovens is drained by a ditch that runs towards the north end of the slip. Bennett Creek also drains part of the Algoma property to the west of the slip.

The land use surrounding the Algoma coke oven area is primarily industrial although residential areas are found to the north.

Potential Environmental Impact

The Algoma site is a very large industrial complex located immediately adjacent to the St. Mary's River. In the past, PAH contamination, which is suspected of originating from the Algoma Plant site, has been found in the sediments and aquatic life of the Algoma Slip and the St. Mary Rivers adjacent to the plant site and the slag dump. Coal tar contamination has also been found as free product in Bennett and Spring Creeks and in the area of the Domtar plant site. Both of these creeks drain to the Algoma slip and therefore it is possible that coal tar contaminants may have been discharged to the slip.

The MOE is presently conducting a study to assess the presence of toxic contaminants in the groundwater, seepage and surface runoff associated with the slag disposal site. Algoma Steel and Domtar are presently investigating and remediating contaminants in the area of Spring and Bennett Creeks.

5.3.5 Industrial Manufactured Gas Plants

5.3.5.1 Cambridge (Preston) - Pattinson Woollen Mill

Site Description

A woollen mill operated by Geo. Pattinson and Co. used a gasification plant to provide gas for lighting during the period 1870s to the 1890s. The gas plant was a small facility at the edge of the mill property and occupied only about 0.1 hectares. The gas plant is reported to be oil gasification but it may have included coal as well. The mill and gas plant were located at what is now 498 Eagle St. N. adjacent to the Speed River. The gas works were demolished in the 1890s for construction of what is today an office building.

The property today is used for industrial purposes for the manufacture of thermoplastic molding compounds. Several original buildings from the 1890s remain on-site and have been incorporated into new buildings and additions. The land surrounding the property has industrial/commercial land uses or is vacant. The Speed River is adjacent to the site to the north.

Potential Environmental Impact

The Pattinson Woollen Mill was a large woollen mill but the gas works was relatively small. There have been no reported problems with wastes on-site, and no visible wastes, odours or water pollution were observed.

Given the lack of evidence of waste and the small operation it is unlikely that the gas plant has resulted in a significant impact on the environment. If an impact were to occur the Speed River which is adjacent to the site would be the most likely receptor. Municipal water wells are located on the north (opposite) side of the river at a distance of about 300 m but it is unlikely that these wells would be impacted by wastes from the gas plant.

5.3.5.2 Ottawa - Fuel Testing Station/Fuel Research Laboratories

Site Description

The Mines Branch of the Federal government operated a fuel testing station and a fuel research laboratory at 552 and 562 Booth St. respectively. These facilities undertook semi-industrial scale coal carbonization studies to assess Canadian coal in the approximate period 1911 to the 1940s.

A Westinghouse suction bituminous coal gas producer was operated at 552 Booth St. The original building at 552 Booth St. was rebuilt in the late 1920s. A two ton by-product coke oven was also used at the rear of the building at 562 Booth St. in the 1920s and 1930s. The original building located at 562 booth St. is still in use.

Today the buildings at 552 and 562 Booth St. are part of a complex of government buildings used by the Department of Energy, Mines and Resources. The buildings at 552 and 562 Booth are used as government offices and laboratories. There is no groundwater use in the area and the closest water body is Dows Lake located 500 m south of the site.

Potential Environmental Impact

The potential environmental and human health impact at this site is considered minimal based on the lack of evidence of buried waste, and likely small volume of by-product tars generated by the intermittent use of the gas producer and coke oven. Potential environmental impacts are also mitigated at this site by lack of groundwater use in the area and the distance to Dows Lake. Potential environmental impacts at the site are also complicated by the historic use of the land between 552 and 562 Booth for the underground storage of liquid petroleum fuels.

5.3.5.3 Niagara Falls - American Cyanamid Co.

Site Description

The American Cyanamid Co. operated a coal gasification plant in Niagara Falls, Ontario from at least 1916 to 1920 as part of their Fourth Avenue Fertilizer works. The manufactured gas plant occupied a small area of 0.7 hectares and based on 1916 fire insurance plans had a gas house, tar well, gas purifiers and gasometer. The use of the gas plant is uncertain although it may have been used in the manufacture of calcium cyanamide fertilizer or to underfire lime kilns. Calcium cyanamide ($CaCN_2$) was manufactured by reacting nitrogen with calcium carbide which was manufactured from coke and lime in an electric furnace. Nitrogen (ammonia) and coke are both by-products of coal gasification.

The former gas works is now occupied by a furnace house as part of the Cyanamid Canada Inc. Fourth Avenue plant. Access to the site is restricted and the plant is surrounded by vacant land to the north, railway to the east, residential property to the south and parkland and commercial land to the west. On-site inspections of the former gas works area were not performed.

Potential Environmental Impact

Potential environmental impact at this site is complicated by the presence of on-site contamination of groundwater and soil with cyanide. The site and surrounding area has been the subject of an MOE preliminary hydrogeologic study and waste area identification and assessment studies completed by consultants for the property owner.

The potential health and environmental impact resulting from the former gas works are expected to be low because of the lack of groundwater use, distance to surface water, controlled site access and continued industrial operation. Visible tar wastes were historically

reported as a tar residue in a geotechnical borehole drilled for construction of the furnace house that subsequently was built on the gas works site. Odours were detected in the vicinity of the site but these were associated with the present operation of the plant and not the former gas works.

5.3.5.4 North Bay - Pintsch Compressing Co. Ltd.

Site Description

A Pintsch gas (oil pyrolysis) plant was located in North Bay at 535 Stanley Street near to the corner of Regina Street. The plant was operated by the Pintsch Compressing Co. Ltd. from 1910 to 1956 to supply gas to railway cars.

Today the site is occupied by a manufacturing company that produces and repairs crushers for the mining industry. Several additional buildings are found on the property and the original gas plant building is still in use. Access to the site is controlled by fences and a gate. Land use around the property consists of primarily industrial use although a park is located to the south.

Potential Environmetal Impact

This site has had no reported environmental impacts nor is there any evidence of wastes or odours on-site. A building sump located adjacent the former gas plant building was also free of odours.

Based on the industrial land use, controlled access and no evidence of on-site wastes, the former Pintsch gas plant site is unlikely to create an environmental impact.

5.3.5.5 Toronto - Pintsch Compressing Co.

Site Description

The Pintsch Compressing Co. operated an oil pyrolysis (Pintsch gas) plant in Toronto in the area south of Peter Street between Front St. W. and Lakeshore Blvd. W. from about 1906 to 1960. The manufactured gas was used to illuminate railway cars.

The site today is under development for Toronto's new domed stadium. Most of the area is Canadian National railway land. Land uses in the surrounding area include commercial (office tower), recreational (CN Tower), and industrial (CN railway) uses. The Toronto Harbour in Lake Ontario is located approximately 200 m south of the former site.

Potential Environmental Impact

There have been several recorded instances of evidence of wastes associated with the former Pintsch gas plant over the last three years. An investigation in 1985 of the harbour front (Brown Associates Ltd., 1986) found oil staining and fuel odours on surface soil samples from a borehole drilled in the vicinity of the Pintsch gas plant. During the construction of the domed stadium in 1986 underground tanks were removed from the gas plant site and the tanks were found to contain fluid with hydrocarbon odours. Most of the contaminated soil was removed during the construction of the stadium.

Given that most of the contaminated soil and the underground tanks were removed for disposal it is unlikely that the former Pintsch gas plant represents a significant environmental problem. Environmental impacts from this site are expected to be minimal.

5.3.5.6 Windsor - Union Natural Gas

Site Description

The Union Natural Gas Company operated an oil gasification plant in Windsor, Ontario for the purpose of intermittenly producing manufactured gas to supplement natural gas supplies. The plant was operational from 1929 until the 1950s and located on 3rd Concession Road (now North Service Road) and bounded by Howard Avenue and Grand Marais Road. When operational, the Union Natural Gas site included both natural gas facilities (storage spheres, compressors, metering house) and manufactured gas facilities (gas house, gasometer, tar separators, gas scrubbers and tar storage tanks). The site was about 5 hectares in area.

The site today is still partially occupied by Union Gas while the north east part of the site is used by a construction company. The concrete base of the manufactured gas holding tank and one of the original buildings remain on-site. Adjacent land use includes parkland and residences to the north and commercial businesses to the east and west and the E.C. Row Expressway to the south. A small creek runs through the site.

Potential Environmental Impact

The inspection of this site did not identify the presence of any type of wastes in the area of the site. The gas holding tank base is exposed and clean. These were no odours detected in the former gas plant building. An inspection of the creek including several drainage pipes adjacent to the site did not provide an indication of water pollution.

Based on the lack of evidence of wastes on-site and the apparent negligible impact on the creek this site is not considered to represent a significant environmental impact.

5.3.6 Wood Distillation Plants

5.3.6.1 Deseronto - E.W. Rathbun Co.

Site Description

In Deseronto, the E.W. Rathbun Co. operated a chemical plant located on Main Street between First and Second Streets on the Bay of Quinte. The plant was a charcoal oven by-product plant and a wood distillation plant that produced wood alcohol and by-products including tar oil, wood pitch and wood creosote. E.W. Rathbun Co. operated the first wood distillation chemical plant in the province from 1889 to 1902 and then was taken over by the Standard Chemical Co. from 1902 to 1920. The plant was also associated with the Deseronto Gas and Water Co. which operated a coal gasification plant on adjacent property (see INTERA, 1987).

The chemical plant occupied about 1 hectare of land on the shore of the Bay of Quinte. The property presently holds a furniture factory, and two residences. The second residence was constructed in 1987. Remanants of the chemical works and the gas plant are found on-site with the outline of a gas holding tank and foundations of the chemical works still apparent.

Potential Environmental Impact

The potential environmental impacts of the chemical works are combined with the gasification plant because the two processes are similar in terms of the waste products. Potential environmental impacts from the chemical works and gas plant are most likely to occur if waste materials remained on-site. The potential for buried wastes on-site is evidenced by several historical occurrences. During construction of a house in 1951, it was necessary to let

the foundation excavation stand open for about one month to vent gases from the soil. The excavation was about 1.2 to 1.5 m below the surface and about 0.6 to 1.0 m into bedrock. The location of the house is about the same location as the former gas plant buildings. During the site visits, the house basement was inspected and was found to be free of odours with a sump that contained clean, odourless water.

Another possible indication of waste on-site is the presence of the gas holding tank. Apparently in 1949, the foundation of the tank was filled in. It is possible that coal tar waste may remain at the base of the foundation.

The most likely health effects or environmental impacts caused by excavation into waste material is from dermal contact and vapour inhalation or from the release and contaminant migration of either coal tar or contaminated groundwater to the Bay of Quinte. It should be noted, however, that because the chemical plant closed in the 1920s, most of the significant environmental impacts may have occurred in the past.

5.3.6.2 Donald - Donald Wood Products Ltd.

Site Description

Donald Wood Products Ltd. was located on Part Lots 6 and 7, Concession 1, Township of Dysart, in the County of Haliburton in the Village of Donald. The plant was owned by Donald Wood Products from 1908 to about 1915 and then by the Standard Chemical Company until 1945. The plant produced a variety of wood extracts from wood distillation including charcoal, wood alcohol, acetate of lime, wood tars, creosotes and natural phenols.

The plant was located on the bank of the Burnt River and occupied about 2 hectares. During its peak the company employed over 60 people and was one of the largest wood distillation plants in Ontario. Today the concrete framework of the plant buildings remain on the site but the property is vacant and largely grassed over. The surrounding area is rural with only a few houses located close to the site.

Potential Environmental Impact

The Donald Wood Products site has had environmental problems in the past. In 1979, a water well drilled by the property owner and located on the opposite side of the river was found to be contaminated with phenols. The well was 56 m deep and terminated in granite bedrock. The well water contained phenols at concentrations of 50 to 240 ppb. The property surrounding the plant site was found to contain patches of tar-like deposits with strong odours of creosote. Studies by MOE (1983) indicated that the tar and on-site soils and vegetation contained PAH, phenols and volatile organics (i.e., benzene). During the site visit, it was noted that wastes including tar, cinders, ash and charcoal were visible surrounding the plant. In the area of the tar patches a slight creosote odour was detected and in the area of some of the buildings a wood alcohol odour was noticed.

In terms of environmental impact it is quite likely that the Donald Wood Products site has caused groundwater contamination in the area of the plant site as evidenced by phenol contamination in a well adjacent to the site. The contaminated well, however, is no longer in use but the extent of groundwater contamination and the impact on other groundwater users is unknown. The shallow groundwater likely discharges to the Burnt River and therefore there may be an impact on the river. Phenol concentrations in the river however indicate that dilution may be sufficient to reduce the contaminated groundwater to nondetectable levels. The river is used as a domestic water supply and for recreation.

The environmental impact of this site is likely limited by its rural setting and limited access. Although groundwater is contaminated there are no apparent users in the immediate area and the impact on surface water is apparently negligible.

5.3.6.3 Fenelon Falls - Standard Chemical Co.

Site Description

In Fenelon Falls, a wood distillation plant was operated by the Standard Chemical Co. Ltd. from about 1903 to 1912-16. The plant produced wood alcohol, acetate of lime, charcoal, acetic acid, acetone and other chemical products. The site was about 1 hectare in area and was located at the west end of Francis Street between Bond and Francis Streets at the shore of Cameron Lake.

The former plant site is presently a town park called Garnet Graham Lakeside Park which includes a beach and playground with uncontrolled, recreational land use. The park also contains a Ministry of the Environment water treatment plant that supplies water to the town from an intake pipe approximately 200 m out in Cameron Lake. The land use east of the site is primarily residential.

Potential Environmental Impact

There is very little evidence to indicate the former presence of the chemical plant because of landscaping of the park. There are no visible wastes or odours on the plant site. Potential environmental impacts may occur from the discharge of waste leachate to the lake and beach if waste material remains on-site but dilution of the leachate by lake water would negate any harmful effects to users of the beach. If waste materials remain on-site, it is more likely that most of the significant environmental impacts occured in the past. Based on the short operating period of the chemical plant and the lack of evidence of wastes on-site it is unlikely that this site represents a significant environmental problem.

5.3.6.4 Lindsay - Canadian Industrial Alcohol Co. Ltd.

Site Description

A wood distillation plant was operated in Lindsay by the Canadian Industrial Alcohol Co. Ltd. from about 1930 to the early 1950s. The plant was located north of Eglington Street adjacent to the Scugog River and east of the Canadian National Railway.

At present, the site is vacant but is being developed for a subdivision. Excavation has begun for the construction of roads and a number of boreholes and test pits have been completed on-site. A gabion wall has been placed along the river bank at the river water level. A steel tank has been excavated from the site.

The former chemical plant occupied about 1.5 hectares adjacent to and west of the Scugog River. The land use to the north and south is largely vacant but there are plans for development of these areas. To the west of the site there is residential development.

Potential Environmental Impact

Excavation for roadways, test pits and boreholes have uncovered wastes from the wood distillation operation at this site. The wastes consist of cinders, ash, charcoal and slaked lime. There are also odours of wood alcohol in the area of exposed waste. Most of the waste material is found adjacent to the river. Wood tar and creosote have not been identified on the site.

The most likely impact of this site would result from the leaching of the waste material and the contamination of the groundwater which would then discharge to the river. Shallow groundwater is not used in the area. While the impact of contaminated groundwater

discharge to the river is likely to have a negligible impact on the river water quality because of dilution, the river sediments may adsorb many of the contaminants. Recent excavation of the bank may have resulted in contaminated sediments being dispersed down river.

5.3.6.5 Lindsay - Hodgson Bros. Chemical Co. Ltd.

Site Description

The Hodgson Bros. Chemical Co. Ltd. operated a wood distillation chemical company adjacent to the Scugog River in Lindsay. The site was located on St. Paul Street west of Denniston Street. The company operated from 1919 to the 1930's on 1.2 hectares of property.

Today the site is a town park with nature trails and playgrounds with unrestricted access. The former chemical plant is still apparent from ruins and foundations in several locations. Adjacent land use is mostly residential to the north, east and south with the Scugog River to the west.

Potential Environmental Impact

Potential environmental impacts would occur if there are leachable wastes remaining on-site which would cause contaminated discharges to the river. At present there is evidence of cinders, ash and charcoal on the site but these are relatively innocous wastes. There is no evidence of tar or odours on-site to indicate the presence of hazardous wastes. Leachate from the identified wastes would migrate to the river, however the impact is likely to be insignificant because of the dilution provided by the river and the nonhazardous nature of the identified wastes.

Based on the current landuse (parkland) and the lack of evidence to indicate harmful wastes on-site the impact from this site is considered to be minimal.

5.3.6.6 Longford Mills - Standard Chemical Co.

Site Description

In Longford Mills, off of Longford Road (Lot 20, Broken Frontage, Rama Township) at Lake St. John, the Standard Chemical Company operated a wood distillation plant. The plant was in operation from the early 1900's to about 1943 and produced a variety of wood chemical products including creosote oils and wood tars. When in operation the plant occupied about 1 hectare.

The property is presently occupied by Domtar Chemicals Co. and the plant site is producing specialty chemicals. Some of the original buildings are still in use. The industrial site has controlled access with a fence and gates. Surrounding the plant the land use is residential to the west and mostly vacant, rural land to the north and south. Lake St. John is located at the eastern boundary of the plant.

Potential Environmental Impact

The potential environmental impacts, if any, of the former Standard Chemical site are likely to be combined with those of the present Domtar Chemical plant. The impacted areas will be Lake St. John and local domestic water wells. Several local water wells are within 300 m of the plant site and typically shallow, less than 20 m in depth, in limestone bedrock. The wells however are likely upgradient with most of the shallow groundwater discharging to Lake St. John.

There is evidence on-site of waste from the wood distillation plant including cinders, ash, and charcoal and in the area of exposed waste there is a slight wood alcohol odour. No evidence of tar was noted around the site and problems of water pollution were not reported or observed.

5.3.6.7 Parry Sound - Standard Chemical Co.

Site Description

The Algoma Lumber and Chemical Co. and later Standard Chemical Co. operated a wood distillation/charcoal by-product plant in Parry Sound from 1909 to about 1924. The charcoal by-product plant was operated in association with the Standard Iron Co. Ltd. which ceased operations by 1917. The site was located about 300 m north of Isabella St. between the split in the CPR tracks and Georgian Bay. The 1924 fire insurance plan shows an oven house, charcoal cooling sheds, limeshed, and still house.

Today the site is unused and is surrounded by bush. Georgian Bay is located about 100 m west of the site. Ruins of the former buildings are evident on-site. Cinders and ash are also visible at the site. Access to the site is unrestricted.

Potential Environmental Impact

Potential human health and environmental impact at this site are considered minor, based on the lack of evidence of buried wastes and lack of potentially impacted groups or resources. The remote location, minimal land use and lack of groundwater use in the area contribute to a low potential for environmental and human health impact.

5.3.6.8 Sault Ste. Marie - Algoma/Standard Chemical Co.

Site Description

From circa 1900 to about 1926, a charcoal by-product/wood distillation plant was operated on a site that is now part of the Algoma Steel Company Steel Mill. The plant was initially operated by the Algoma Steel Co. Ltd. until 1912 and by the Standard Chemical, Iron and Lumber Co. until 1926. The plant was used initially to make charcoal for use in the steel making blast furnaces and later to produce wood distillation by-products such as wood alcohol, acetone, creosote oils and wood tars. The plant was located adjacent to the St. Mary's River about 350 m east of the Algoma slip.

The former site is now replaced by the Algoma Steel Mill.

Potential Environmental Impact

The potential environmental impacts of the wood distillation plant are impossible to distinguish simply because the current land use obscures any evidence of the former plant.

5.3.6.9 South River - Standard Chemical Co.

Site Description

The Standard Chemical Company operated a wood distillation plant in South River from 1903 to 1954. The plant which was located off of Ottawa Avenue at Forest Lake, was also used to make charcoal by the Charcoal Supply and Sales Co. and the Beaver Charcoal Co. from 1955 - 1967. The wood distillation plant was used to make wood chemicals such as acetic acid, acetone, methyl alcohol, creosote oils and wood tars.

Today, the 2-3 hectare site sits vacant, with remanants of the plant including foundations and walls still apparent. A development project, which was to include a small resort, townhouses and a recreation center was planned in 1977, deferred in 1983 and recently reviewed. Adjacent to the site on Ottawa Avenue are houses, a municipal water pump house and wells, and a commercial business. The property is adjacent to Forest Lake which is part of the South River.

Potential Environmental Impacts

The Standard Chemical site in South River may cause an impact on Forest Lake and the municipal wells because wastes, including tars, were found on-site. Waste tar, cinders, ash and charcoal were observed during the site visit, adjacent to the river on the north part of the site, in several locations. In addition, a tar pit existed on the site in 1977 but was not apparent during a site visit. There are also unconfirmed reports of tar on the bottom of the lake. Wood alcohol odours in the area of the foundations were detected.

The primary concern on this site is the proximity of the site to municipal water wells which are located within 300 m of the site. The wells are reported to be at least 20 m deep in sand. Buried wastes on the plant property may contaminate the groundwater which could affect the water quality of the wells. The wells, which are high production wells are located in sand and this material could easily transmit leachate from the site to the wells. High capacity wells would also create significant drawdown which would decrease the transit time from the site to the wells.

The other concern regarding this site is the impact the wastes may have on the lake. The tar pit was located adjacent to the lake and tar wastes are present beside the lake. If the unconfirmed reports of tar in the lake are true there may be an environmental impact in that the lake sediments and possibily aquatic biota will be contaminated.

5.3.6.10 Thornbury - Standard Chemical Co.

Site Description

In Thornbury, the Standard Chemical Co. operated a wood distillation plant on property located beside the Beaver River and bounded by Bay Street, Mill Street, Poplar Street and the river. The chemical plant was in operation from 1916 to 1925 on about 4 to 5 hectares.

The site is presently vacant with some of the original buildings remaining on-site. The site is planned for development with condominiums and apartments to be constructed in the near future. The area surrounding the property is primarily residential.

Potential Environmental Impact

The Standard Chemical site in Thornbury has evidence of waste on-site including tar, cinders and ash. Since the site visit the property owner excavated 14 test pits at the site to evaluate subsurface conditions. Cinders and ash were reported in many of the test pits and solidified tar was observed in the area of the building foundations (Jordan, 1988). Chemical analyses of the tar and some contaminated soil showed the presence of PAH. The property owners are developing a decommissioning plan for this site.

Although some tar was evident at this site, the tar was reported to be in a confined area and in a semi-solid state and therefore migration of tar is unlikely. Because of the small volume of tar observed at the site, the environmental impact from leachate generation and migration to the adjacent river is considered to be minimal.

5.3.6.11 Trout Creek - Dominion Wood and Lumber Co.

Site Description

Dominion Wood and Lumber Co. Ltd. operated a wood distillation plant in Trout Creek for an uncertain period circa 1920. The plant was located south of town and east of the C.N. railway on Concession 1, Parcel 3489 N.S., municipality of the Town of Trout Creek. The plant occupied about 1 hectare.

The plant site is presently rural vacant land and was once used as a sand and gravel pit during the construction of Highway 11. There is little evidence of the former plant except for a mound from a charcoal cooler. Several streams, one flowing from the east and one from the south are adjacent to the former site.

Potential Environmental Impact

The environmental impacts resulting from this site are likely to be negligible primarily because much of the property appears to have been excavated for fill material during the construction of the highway, the plant was in operation for only a short period of time and the area is rural, vacant land. The nearest well is likely greater than 400 m east of the site.

6. RECOMMENDATIONS

Recommendations are grouped into this section as opposed to Section 5 with the individual site descriptions because many of the recommendations for further action at each site are similar. The recommendations are developed only for the 35 former industrial sites identified in this study as per the terms of reference of the study. Many of the active sites have ongoing site assessment studies funded by the property owners and all are being looked at by the Ontario Ministry of the Environment.

For each former industrial site it is recommended as a minimum that the property owner and the municipality be notified that the site was formerly used by an industrial operation that produced or used coal tar or related oil and wood tars and that through disposal or spillage, tar wastes may be present in the subsurface soils. If future excavation is planned at any of these sites the property owner or developer should contact the local office of the Ontario Ministry of the Environment.

For many of the sites, particularly the coal tar distillation and creosoting plants, there is evidence that tar wastes are present in the subsurface soils. For six of these sites, the potential environmental impacts are minimal as a result of a lack of receptors for impact from the waste. Sites where wastes exist but the potential impacts are likely minimal include: Barrett Co. - Toronto, Domtar - Toronto, Paterson & Barrett - Toronto, Paterson - Toronto, Cyanamid - Niagara Falls and Donald Wood Products - Donald. For these sites, it is recommended that the property owner and municipality be notified that tar wastes exist in the ground and that future excavation or development at these sites should be undertaken with this fact in mind.

At six of the sites with evidence of tar wastes there is potential for environmental impact. Site specific recommendations in addition to the above general recommendations, are appropriate for these sites to either more clearly define the chemical nature and physical extent of the wastes or to minimize potential impacts. These sites include Currie Products - Ottawa, Canada Creosoting - Sudbury, Canada Creosoting - Thunder Bay, Calder Creosoting - Sioux Lookout, Domtar - Cornwall and Standard Chemical - South River.

At the Currie Products - Ottawa site coal tar has contaminated the shallow soil and groundwater beside and below an apartment building and the area of a storm sewer that discharges to the Rideau River . Given the ongoing seepage of tar into the lower parking garage of the apartment building and the potential migration of tar along the sewer bedding material to the river, there is potential for environmental impact to the Rideau River. Studies are recommended to evaluate the potential tar migration to the Rideau River and possibly develop remedial plans for the site.

At the Canada Creosoting - Sudbury site, creosote may be contaminating groundwater and surface water that discharges to Junction Creek located south of the site. At this site, surface water and shallow groundwater are collected in a series of ditches and swales that drain across the site to Junction Creek. There is a potential for environmental impact to Junction Creek from creosote and resolution of this potential impact is recommended.

The Canada Creosoting site in Thunder Bay has creosote pitch at surface and is located adjacent to the Kaministikwia River. There is a high potential for environmental impact to the Kaministikwia River through migration of aqueous creosote contaminants and/or separate phase liquid creosote, if present in the subsoils, to the river. Some accumulation of creosote contaminants may also occur in the

Kaministikwia River sediments. Given this high potential for impact, studies are recommended to determine if there is an actual measurable impact on the river.

The Calder Creosoting site at Sioux Lookout has creosote tar visible at surface in several locations and local odours of creosote are reported at the site. Several residences are located within 200-300 m of the former plant site and one residence 800 m away likely obtains water from a well. Given this potential impact and surface water drainage, sampling of the one residential water well and adjacent surface water for creosote contaminants is recommended.

The Domtar - Cornwall site has exposed waste piles consisting of coal tar pitch. At this site, the potential impact is from direct contact with these waste piles. Impacts on the groundwater and surface water are considered minor. For this site, restricting contact with the wastes is recommended, either through covering the waste piles or in the interim, restricting site access.

The Standard Chemical site at South River has reported tar deposits on the land and possibly in the sediments of adjacent Forest Lake. Sediment sampling of Forest Lake for PAH is recommended to determine if tar wastes are present because the lake has recreational use. The most significant potential environmental and human health impact at this site relates to possible contamination of the South River drinking water supply wells located within 300 m of the site. Sampling of these shallow wells for phenols and PAH is recommended.

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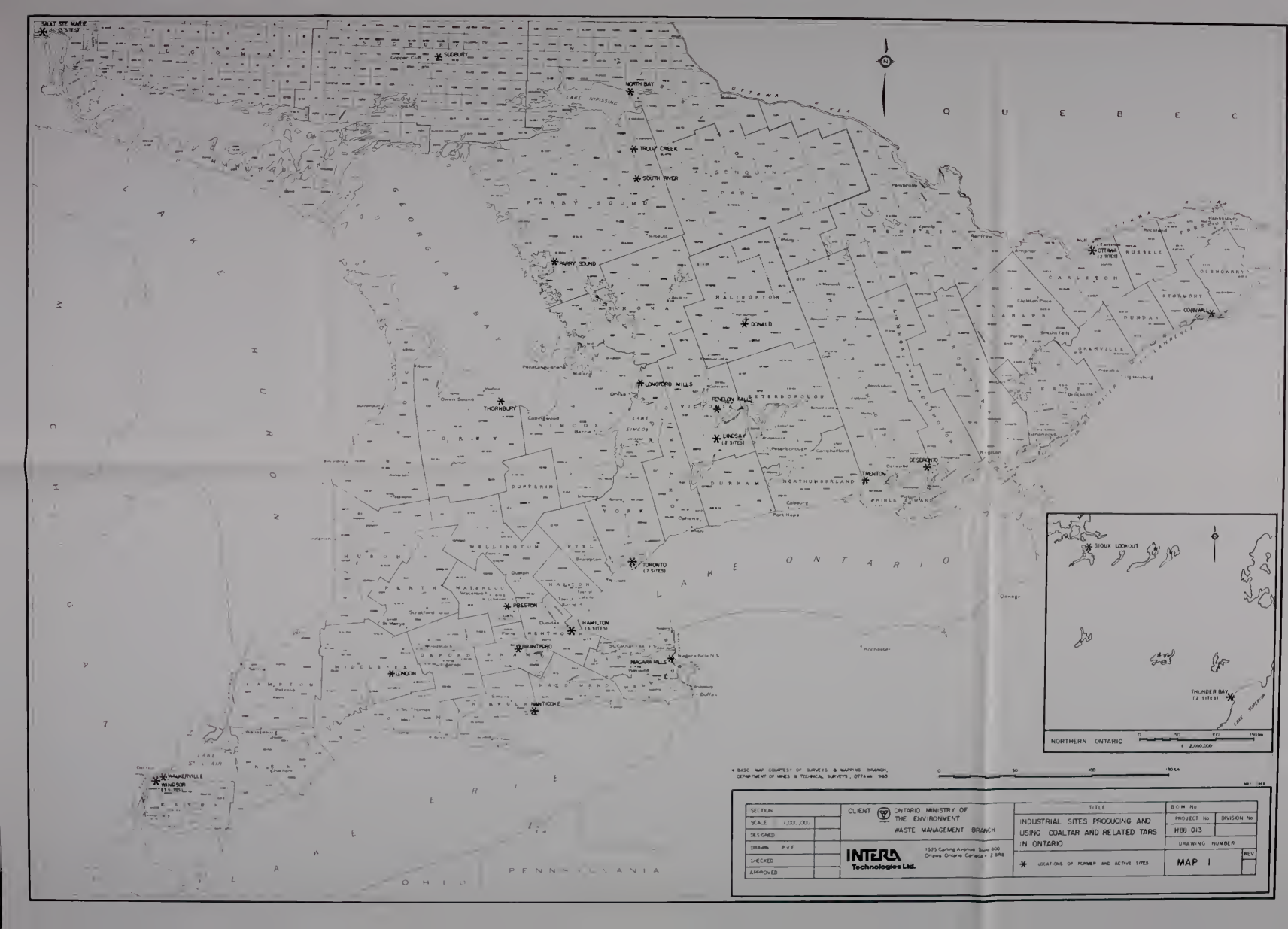
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